



# The PRETORIA CENTRE

of the

## Astronomical Society of Southern Africa

www.pretoria-astronomy.co.za

### NEWSLETTER NOVEMBER 2013

#### *Next meeting*

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

**Date and time:** Wednesday 27 November at 19h15.

**Programme:**

- **Beginner's Corner:** "The Hertzsprung-Russel diagram" by Johan Smit.
- **What's Up?** by Michael Poll.
- 10 minute break — library will be open.
- **Main talk:** "NASA's New Horizons Mission to Pluto" by Dr Henry Throop (NASA). \*
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Bosman Olivier.

\* Read an abstract of the main talk on page 2.

#### *Next observing evening*

Friday 22 November from sunset onwards at the Pretoria Centre Observatory, which is also situated at CBC. Turn left immediately after entering the main gate and follow the road.

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### Report of the meeting on 23 October 2013 - by Michelle Ferreira

The meeting started off with the members and visitors being welcomed, as well as Percy Jacobs welcoming Auke Slotegraaf, on-line from Somerset. Percy announced that three more persons had finished with the ASSA 100 Observation List, i.e. Michael Moller, Louis Kloke and Percy Jacobs. They each received a certificate signed by Auke, an Eridanus gift certificate and the special ASSA Pretoria Centre Top 100 badge. Percy gave some further feedback to others in respect of the amount of time this task had taken, with which observation each had started their journey and also how predominantly either sketches or photographs featured in their respective portfolios. Congratulations to all three and a special thanks was mentioned for Percy as the Observing Director for providing the support to all the participants. No further observing challenge was announced for the rest of this year.

**"What's Up?"** was presented by Danie Barnardo and he mentioned that most of the planets will be visible during the course of the month. Comet ISON (C2012/S1) might not survive its near approach to the sun on 28 November but it might possibly be visible on the 15th @ 04:30, near Spica. The Leonids shower will be visible on 18 Nov at 4:00. In his discussion he also mentioned various galaxies which feature during this month. M31 - Andromeda Galaxy is a spiral galaxy and the largest member of the local group, M33 - Triangulum Galaxy is also a spiral galaxy but smaller than M31, and the Sculptor Group Galaxies to name but a few. The Sculptor Group of Galaxies contains about 14 galaxies and these include NGC 253 - the Silver Coin Galaxy, NGC 300, NGC55, NGC 247, etc.

**"Beginner's Corner"** and the **"Main Talk"** was a collaboration between Johan Smit and Monica Loubser. She is a qualified nurse and currently works in the Occupational Health and Safety field. Her interest in astronomy spans over many years and she has been involved with the Voortrekkers for 16 years already. She is a team officer and is with the Unika Voortrekker Kommando. Monica has presented astronomy courses for the Voortrekkers' badges since 2004. Gr 4 badge is in Space Observation, Gr 6 badge in General Astronomy and Gr 8-12 are the Advanced Scouts. Gr 4 attend a presentation at HARTRAO and they do planet viewing through a telescope. Gr 6 learn to tour the Solar System and attend a star party with telescopes and binoculars. The Advanced Scouts cover a myriad of topics of which astronomy, astrology, seasons, meteors, comets, galaxies, the speed of light, light years, stars and planets, telescopes, binoculars, Newton's law of gravity, Hertzsprung-Russel diagram, Flamsteed system are but to name only a few. Johan Smit is actively involved with the Voortrekkers, attends as a guest speaker for their training sessions together with Monica and also hosts groups of Voortrekkers on various other occasions, sometimes together with other members of the Pretoria Centre. Monica shares some badges with members attending the meeting and Johan (jokingly) asked if they all believed that they would be able to pass the same competency test as the Voortrekkers (LOL). It was a most illuminating talk to understand how the youngsters are being initiated to the topic of astronomy. Afterwards comments were shared of coffee and biscuits.  $\Omega$

### Abstract of main talk to be given on Wednesday 27 November

Pluto is the coldest and most distant of the nine 'classic' planets. Its ancient surface preserves a record of the history of the solar system and provides clues to the composition of comets and other bodies in the outer solar system. Astronomers have never seen the surface up close... but they will soon! Planetary Scientist Dr. Henry Throop will tell the story of this NASA spacecraft mission, from its development and construction, through launch in 2006, to plans for its arrival at Pluto on July 15, 2014, and onward to encounters with bodies in the distant Kuiper Belt.

## Summary of "What's Up?" for December 2013 and January 2014 to be presented on 27 November 2013 - by Michael Poll

"What's Up?" looks first at the present sunspot numbers, and notes the progress of the current sunspot cycle. (spaceweather.com & cycle24.com).

**Venus** has put on splendid show over the past months, as it has been high above the Sun at sunset, and the reasons for this will be discussed. Also to be shown is an unusual way of locating Venus in daylight. Venus becomes much lower in the sky during December, and passes through inferior conjunction on January 11th 2014. By the beginning of February 2014 it will be visible in the eastern morning sky before sunrise.

The **Moon** will be passing Venus on December 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup>, and it will be near Aldebaran, in Taurus, on the night of December 15<sup>th</sup> – 16<sup>th</sup>.

**Jupiter** is in the evening sky for most of the night during December and January. It is in Gemini, and reaches opposition January 5<sup>th</sup> 2014. The Moon will be near it on December 19<sup>th</sup>, and again during the night of January 14<sup>th</sup> & 15<sup>th</sup>.

The **Geminid** Meteor shower is active during December. The maximum is on December 14<sup>th</sup>. The best dates to observe are December 13<sup>th</sup> 14<sup>th</sup> & 15<sup>th</sup>. Look towards the north east from about 23h30 – 03h00, but note that the nearly full Moon will be in the west and may interfere.

**Mars** is in the north east before sunrise at present. It rises at midnight on December 31<sup>st</sup>, and during January will rise progressively earlier. Look in the early hours to see Mars near Porrima (Gamma Virginis) from December 26<sup>th</sup> - 31<sup>st</sup>. The Moon near Mars on December 26<sup>th</sup> (early hours) and again on the night of January 22<sup>nd</sup> – 23<sup>rd</sup>. Mars will be bright in the evening sky in March, April & May 2014

**Mercury and Saturn** are close together in the morning sky before sunrise at the beginning of December, although they will be in twilight and not easy to spot. During December Mercury disappears from the morning sky (it is in superior conjunction on December 29<sup>th</sup>), but Saturn rises earlier each day as the month progress, and will be well up in the east before twilight starts by the end of December and into January. The Moon will be near Saturn on December 1<sup>st</sup>, December 29<sup>th</sup> (early hours) and again in the early hours of January 25<sup>th</sup> and January 26<sup>th</sup>.

**Constellations** to be noted include Pegasus, Auriga, Gemini, Taurus, Orion, Leo, Corvus & Virgo. The viewing prospects for **Comet Ison** in the southern hemisphere in December are marginal but will be noted.  $\Omega$

## Pretoria Centre Practical Observing Report Friday October 18<sup>th</sup> 2013 by Michael Poll

There were eight people at this observing evening, including three visitors. However there were also clouds in attendance with accompanying lightning flashes and thunderclaps, from which the reader will conclude that we did no viewing. In fact, this weather represented the arrival of the first meaningful rain of the rainy season. Well, there were a couple of breaks in the cloud, through which peeked a watery looking Venus and a watery looking Moon, but they were soon gone.

Johan did explain about telescopes to the visitor, showing the ones he had brought with him, and he opened the dome to show the Centre 12 inch Newtonian telescope.  $\Omega$

## A late note about Scopex that took place on 20th July 2013

Three members received awards on this occasion:

- **Percy Jacobs** for his 6" equatorial.
- **Johan Smit** for "Spoetnik" (Aquarius), Castor and Pollux.
- **Bosman Olivier** for his remounting of a 6" scope, the string scope and mounting of a World War I camera lens.

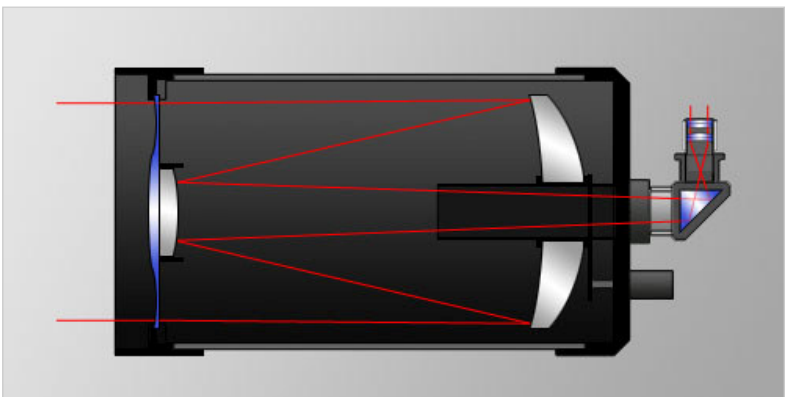
## Basics: Catadioptric telescopes - by Pierre Lourens

This type of telescope is a closed tube optical telescope employing a combination of mirrors and lenses to form the image. ("Catoptrics": use of curved mirrors. "Dioptrics". use of lenses.) This is usually done so that the telescope can have an overall greater degree of error correction than their all-lens or all-mirror counterparts, with a consequently wider aberration-free field of view. It combines the advantages of refractors and reflectors as well as allowing a compact design. Because of their optical design, catadioptric telescopes have markedly reduced coma compared to reflectors and essentially none of the chromatic aberration found in refractors. Stars are essentially point-like and coma-free across the visual field of a catadioptric telescope, and there's no trace of coloured halos around bright stars and planets to mask faint details and colours.

The primary mirror may be spherical or parabolic, depending on the system. The secondary mirror has a matching curvature and the lens element is a full aperture correcting plate placed in front of both mirrors. There are many types. The Schmidt-Cassegrain and Maksutov-Cassegrain telescopes are two common types.

### The Schmidt - Cassegrain telescope (SCT)

In an SCT the incoming light passes through the Schmidt corrector plate at the front of the telescope. (This corrects for the spherical aberration of the primary mirror.) It is then reflected from a concave, spherical primary mirror with a hole in it and located at the back of the scope. This reflects the light to the front of the telescope where it is reflected again by a smaller, convex secondary mirror, which is attached to the corrector plate.

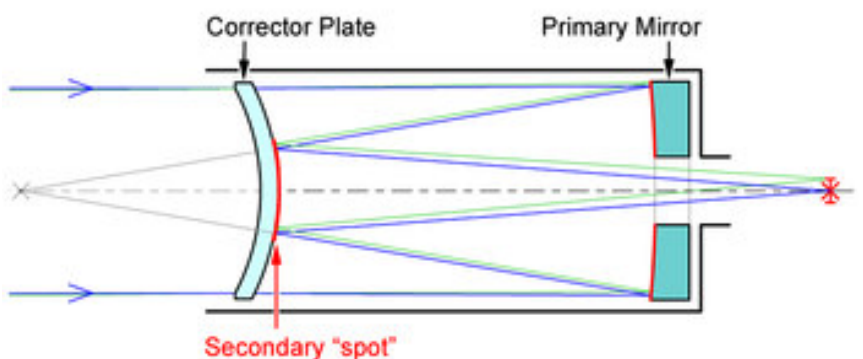


This eliminates the need for a 'spider' that would cause diffraction spikes. The secondary mirror acts as a field flattener. Finally, the light travels back through a hole in the primary mirror to a final focal plane located behind the primary mirror, where an eyepiece is located for visual observing (or a camera for photography). By folding the light in this manner, an SCT can be made much smaller than an equivalent Newtonian or refractor. There are some variations in the design.

Some Celestron and Meade commercial telescopes are of this type.

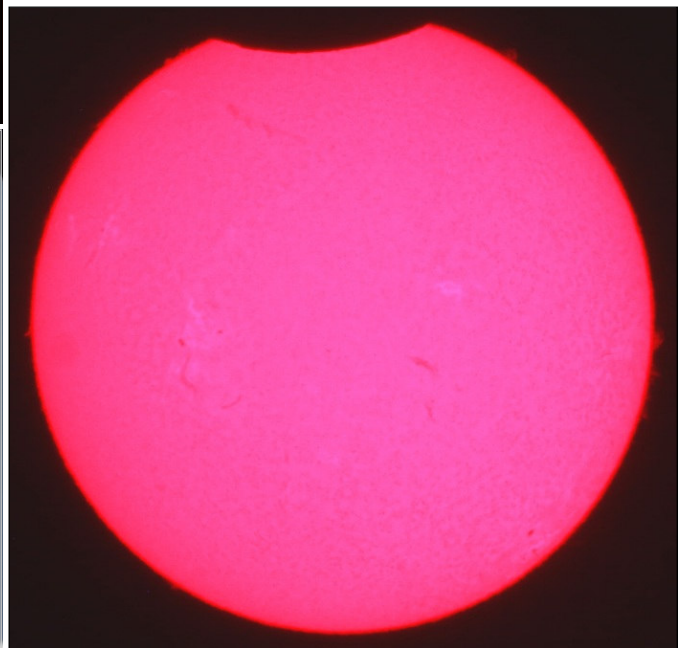
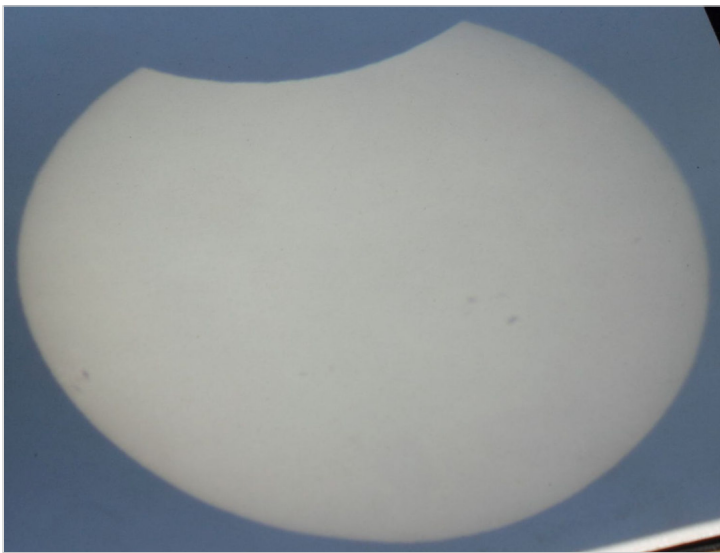
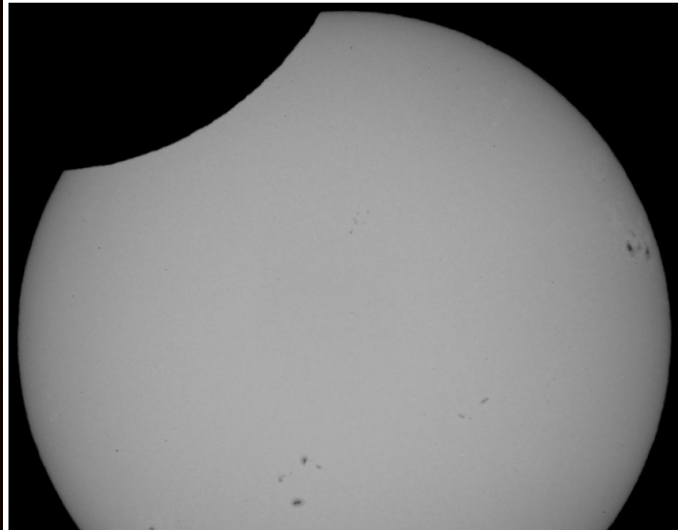
### Maksutov - Cassegrain telescope (MCT)

The basic MCT design is similar to that of the SCT. It has all-spherical surfaces and have, as secondary, an aluminized spot on the inner face of the corrector plate. The spherical surfaces have the advantage of simplifying construction. Like the SCT, the design has the advantage of fixing the alignment of the secondary and eliminates the need for a 'spider' that would cause diffraction spikes.



The disadvantage is that, if all-spherical surfaces are used, such systems have to have focal ratios above  $f/15$  to avoid aberrations. Also, a degree of freedom in correcting the optical system by changing the radius of curvature of the secondary is lost, since that radius is the same as that of the rear corrector plate face. Again, there are variations in the design, like aspherization of the front corrector plate surface (or the primary mirror) in order to reduce aberrations, or additional elements in the optical path.

Orion produces commercial telescopes of this type.  $\Omega$



Photographs of the partial solar eclipse on Sunday afternoon 3 November 2013. From top right clockwise, the photographs were taken by: Johan Moolman, Johan Moolman, Johan Smit (Sun's image projected on a screen), Percy Jacobs.

See a video clip of the solar eclipse as viewed from Proba-2, ESA's Sun-watching satellite that is orbiting Earth, as it dipped in and out of the Moon's shadow several times.

[http://www.esa.int/Our\\_Activities/Space\\_Science/Highlights/Proba-2\\_views\\_eclipse](http://www.esa.int/Our_Activities/Space_Science/Highlights/Proba-2_views_eclipse)

### Feature of the month: The Shapley supercluster - by Pierre Lourens



This supercluster was discovered in the 1930s by American astronomer Harlow Shapley. It is a remarkable concentration of galaxies in the Centaurus constellation. Boasting more than **8000 galaxies** and a total mass of more than ten million billion ( $10^{16}$ ) times the mass of the Sun, it is the most massive structure within a distance of about a billion light-years from our Milky Way galaxy. Several hundred galaxies and the huge amounts of gas that permeate them are depicted in an image of the core of the Shapley supercluster.  $\Omega$

[http://www.esa.int/Our\\_Activities/Space\\_Science/Highlights/A\\_cosmic\\_giant](http://www.esa.int/Our_Activities/Space_Science/Highlights/A_cosmic_giant)



**Top:** The **Eagle Nebula** (catalogued as **Messier 16** or **M16**, and as **NGC 6611**, aka the **Star Queen Nebula**) is a young open cluster of stars in the southern constellation Serpens (The Serpent). Inside it can be seen the "Pillars of creation" once imaged in detail by the HST. [http://en.wikipedia.org/wiki/Eagle\\_Nebula](http://en.wikipedia.org/wiki/Eagle_Nebula)

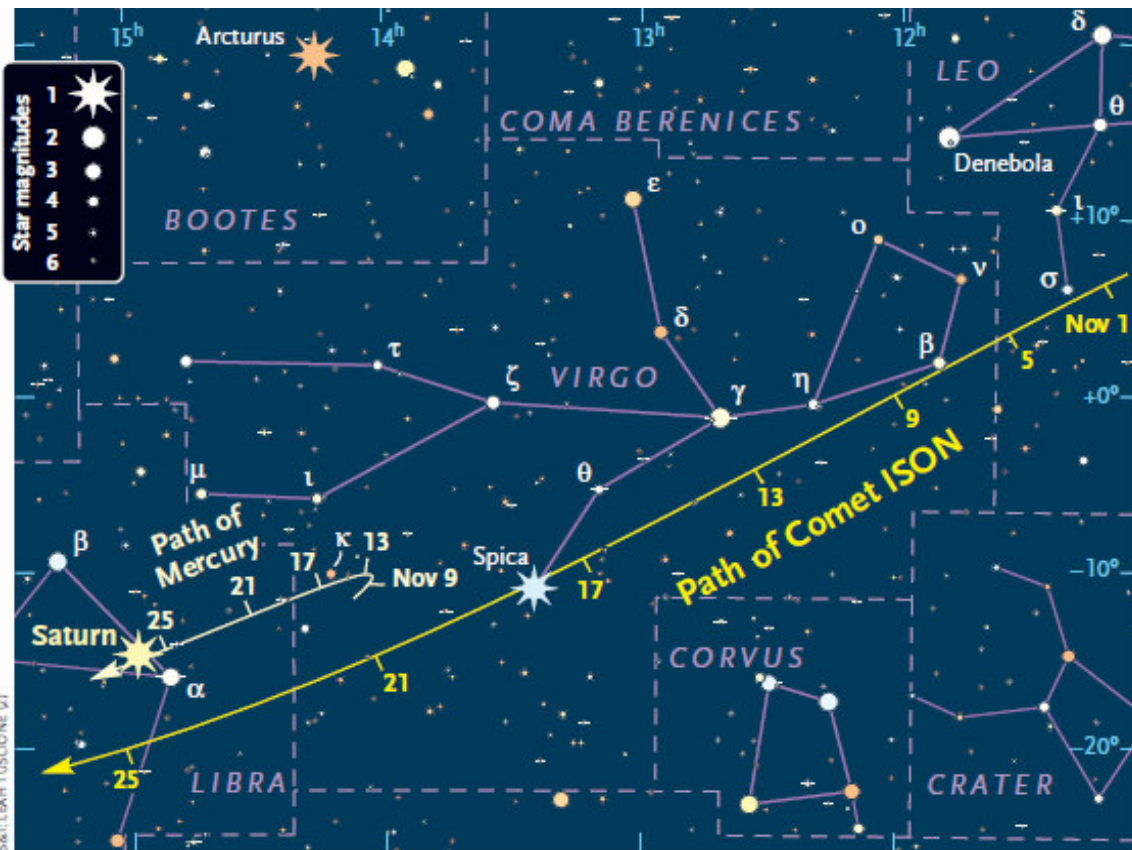
**Left:** **47 Tucanae**, aka **47 Tuc** or **NGC 104** is a globular cluster located in the southern constellation Tucana (The Toucan). It is about 16700 light years away, and 120 light years across. [http://en.wikipedia.org/wiki/47\\_Tucanae](http://en.wikipedia.org/wiki/47_Tucanae)

**Photographs taken by Johan Moolman.**

**NOTICE BOARD**

**Observation of Comet ISON Saturday 23 November 2013**

Members of the Pretoria Centre of the ASSA will make observations of the comet on this day from 03h00 – 06h00 at Fort Schanskop on the Voortrekker Monument Heritage Site. Those who want to partake must contact our chairman, Bosman Olivier, at 082 883 1869 or [bosman@pretoria-astronomy.co.za](mailto:bosman@pretoria-astronomy.co.za) **immediately** to book a place. First come, first served. Only 15 people will be allowed to enter the Voortrekker Monument Heritage Site at this early hour. Those who will have booked must be present at the gate to the site between 02h45 and 03h00, so that the gate can be opened to let them all in in one group. Bring telescopes & cameras. See the chart below.



**For astrophotographers**  
How to photograph full moon silhouettes. Also watch the video clip on this website: <http://markg.com.au/2013/01/full-moon-silhouettes/>

**On our monthly observing evenings at our telescope at CBC, Michael Poll will always be present, no matter what the weather conditions.**

**Link to Facebook.** It can be found on the home page of our website.

**Quintet of moons.** Five moons of Saturn in one image made by spacecraft Cassini, now orbiting Saturn. [http://spaceimages.esa.int/Images/2013/11/Quintet\\_of\\_moons](http://spaceimages.esa.int/Images/2013/11/Quintet_of_moons)

**Sky Guide Africa South 2014** will be available for collecting at the meeting on Wednesday 27 November. Each member is entitled to a copy.

## Noteworthy items

### Solar system

- **NASA spacecraft reactivated to hunt for asteroids.** A NASA spacecraft that had discovered and characterized tens of thousands of asteroids throughout the solar system before being placed in hibernation will return to service for three more years. This will support NASA's new asteroid initiative.  
<http://www.nasa.gov/press/2013/august/nasa-spacecraft-reactivated-to-hunt-for-asteroids/>
- **Hubble's new view of comet ISON.**  
[http://spaceimages.esa.int/Images/2013/10/Hubble s new view of Comet ISON](http://spaceimages.esa.int/Images/2013/10/Hubble_s_new_view_of_Comet_ISON)
- **Mars showcase.** See a video clip of an animated flight over Mars.  
[http://spaceinvideos.esa.int/Videos/2013/10/Mars showcase](http://spaceinvideos.esa.int/Videos/2013/10/Mars_showcase)
- **NASA prepares to launch first mission to explore Martian atmosphere.** A NASA spacecraft that will examine the upper atmosphere of Mars in unprecedented detail is scheduled for launch on 18 November. <http://www.nasa.gov/press/2013/october/nasa-prepares-to-launch-first-mission-to-explore-martian-atmosphere/>

### Exoplanets

- **Giant planet seen lurking inside the galactic bulge.** Astronomers have discovered a giant world, with mass about eight times Jupiter's mass, orbiting a star over 25 000 light-years away, deep inside the Milky Way's galactic bulge. They used the microlensing technique. <http://news.discovery.com/space/astronomy/giant-planet-seen-lurking-inside-the-galactic-bulge-131004.htm>
- **Scientists discover the first Earth-sized rocky exoplanet.** But its surface is a hellish inferno. <http://www.nasa.gov/kepler/scientists-discover-the-first-earth-size-rocky-planet/>
- **Seven-planet solar system found.** It resembles our solar system, but all seven planets are closer to their host star. They would all fit within the Earth's distance from the Sun. <http://www.bbc.co.uk/news/science-environment-24642603>
- **Water-rich planetary building blocks found around white dwarf.** Water-rich asteroids around a white dwarf means there was definitely potential for habitable planets in this exoplanetary system. The system almost certainly had (and possibly still has) planets, and it had the ingredients to deliver lots of water to their surfaces. <http://hubblesite.org/newscenter/archive/releases/2013/38/>

### Our Galaxy

- **Scientists unravel secrets of monster black hole at center of Milky Way.**  
<http://news.nationalgeographic.com/news/2013/09/130924-supermassive-black-hole-milky-way-space/>
- **A galactic bubble with a large surprise.** The bubble has been blown by a star at its centre. Nestled within the shell around it is a growing embryonic star that is already eight times as massive as our Sun.  
[http://www.esa.int/Our Activities/Space Science/A Galactic bubble with a large surprise](http://www.esa.int/Our_Activities/Space_Science/A_Galactic_bubble_with_a_large_surprise)
- **Countdown to launch of ESA's billion-star surveyor.** ESA's billion-star surveyor Gaia was scheduled to be launched from Europe's spaceport in Kourou on 20 November to begin a five-year mission to map the stars with unprecedented precision. Due to recently-discovered technical issues, ESA has postponed the launch date. [http://www.esa.int/Our Activities/Space Science/Gaia/Countdown to launch of ESA s billion-star surveyor](http://www.esa.int/Our_Activities/Space_Science/Gaia/Countdown_to_launch_of_ESA_s_billion-star_surveyor)  
See also the newsletter for February 2011, page 7.

### Dwarf galaxies

- **A flock of stars.** See an image (made by the HST) of dwarf galaxy ESO 540-31.



[http://www.esa.int/Our Activities/Space Science/A flock of stars](http://www.esa.int/Our_Activities/Space_Science/A_flock_of_stars)

- **Densest nearby galaxy.** The ultra-compact dwarf galaxy M60-UCD1 is packed with an extraordinary number of stars. <http://www.nasa.gov/press/2013/september/nasas-hubble-and-chandra-find-evidence-for-densest-nearby-galaxy/>

### **Space research**

- **3D printing for space - the additive revolution.** 3D printing is getting ready to revolutionize space travel. ESA is paving the way for 3D-printed metals to build high-quality, intricate shapes with massive cost savings. Almost anything that can be designed by computer can be printed as a physical item. [http://www.esa.int/Our Activities/Human Spaceflight/Research/3D printing for space the additive revolution](http://www.esa.int/Our_Activities/Human_Spaceflight/Research/3D_printing_for_space_the_additive_revolution)
- **NASA's Orion spacecraft comes to life.** Orion is America's next generation spacecraft that will take astronauts to exciting destinations never explored by humans, and provide safe re-entry from deep space. "*The work we're doing now, the momentum we're building, is going to carry us on our first trip to an asteroid and eventually to Mars. No other vehicle currently being built can do that, but Orion will*", said NASA's deputy associate administrator for exploration systems development. Exploration Flight Test -1 (EFT -1) will be undertaken next year. Exploration Mission -1, an unmanned mission, is planned for 2017.

**Editor's comment:** This is like science fiction becoming reality. Ω

<http://www.nasa.gov/press/2013/october/nasas-orion-spacecraft-comes-to-life/>



**A halo around the Sun. Photograph taken by Wessel Nel.**

Venus, Moon, Saturn, Mercury, Antares. Photograph taken by Neville Young.



Tuesday 8th October 2013 18h55  
 Looking West from Pretoria  
 20secs f3.5 SONY Cybershot

Pretoria Centre committee		
Chairman	Bosman Olivier	082 883 1869
Vice Chairman	Pat Kühn	082 895 5686
Secretary	Michelle Ferreira	073 173 0168
Newsletter Editor	Pierre Lourens	072 207 1403
Treasurer and Membership Secretary	Rynhardt van Rooyen	082 325 8745
Assistant Treasurer	Michelle Ferreira	073 173 0168
Librarian	Danie Barnardo	084 588 6668
Assistant Librarian	Pat Kühn	082 895 5686
Curator of Instruments	Johan Smit	072 806 2939
Public Relations Officer	Fred Oosthuizen	072 373 2865
Observing Coordinator	Percy Jacobs	082 498 4680
Webmaster	Danie Barnardo	084 588 6668
Member	Michael Poll	074 473 4785
Member	Tony Viljoen	072 247 6648

**Old newsletters:** All old newsletters from January 2004 onward are on our website. They contain a record of our Centre's activities as well as astronomical information.

**Database:** Members are reminded that a database of the books in our library is to be found on our website. The database was created by Danie Barnardo, one of our committee members.