



# The **PRETORIA CENTRE**

of the

## Astronomical Society of Southern Africa

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

### NEWSLETTER MARCH 2016

#### Next meeting

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

**Date and time:** Wednesday 23 March at 19h15.

**Programme:**

- **Beginner's Corner:** "Star charts" by Percy Jacobs.
- **What's Up?** by Michael Poll.
- 10 minute break — library will be open.
- **Main talk: "The planet Mercury" by Pierre Lourens. \***
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Bosman Olivier.

\* See page 2.

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 ★ **Next observing evening** ★  
 ★ Friday 18 March from sunset onwards at the Pretoria Centre Observatory, which is also situ- ★  
 ★ ated at CBC. Turn left immediately after entering the main gate and follow the road. ★  
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## Chairman's Report for the meeting of 24 February 2016 - by Johan Smit

After the usual introductions, notices and welcomes to visitors, we jumped straight into a very busy and interesting meeting.

"Beginner's Corner" was presented by Michael Poll. He described the mechanics behind transits of Mercury, starting with transit seasons. Transits of Mercury currently occur in May and November. Additionally he explained the concepts of nodes and their effect on the time window where transits is possible. The history and sequences of transits were explained as well as the history of these from the earliest predictions to the visibility of future transits. We were encouraged to make a plan to observe the transit on 9 May 2016, because if we miss the next one in November 2019, the next one will only happen in 2032.

Then Percy Jacobs did his usual busy and informative "What's Up?" presentation. He concentrated on the various groupings of planets during March. The constellations to concentrate on were highlighted to maximise your ASSA 100 Challenge observations.

The evening was concluded with a very informative 3 part series of training videos on spectroscopy. Despite my initial reservations about the use of videos, the reaction of the audience proved me wrong. Seldom had we had so many questions and comments on a topic as we had after these videos. The videos described the subject of spectroscopy very well and in an understandable way. From the theory of how a spectrum is generated to how various techniques is used in astronomy.

My sincere thanks to Percy Jacobs for assisting in answering the questions and presenting an impromptu slide show of his spectroscopy images. I am sure that we may see more spectroscopy enthusiasts emerging in Pretoria.

The use of quality training videos at our meetings seems to be a good option. It is always nice to have a real live speaker, but a well-executed video presentation backed up by our local knowledge seems to be equally good, if not better. At least the personality or style of a live presenter does not cloud the topic. The reaction to this trial run proves that we should use it more.

The meeting ended with very lively socializing and discussions over the usual cup of tea or coffee.

See you at our next meeting, on 23 March 2016.  $\Omega$

**About the main talk to be given on 23 March:** As preparation, see an animation of what a stationary observer on Mercury would see during half a solar day (i.e., from sunrise to sunset) that will last a whole Mercury year (= 88 Earth days.) Also, near perihelion, the Sun, moving eastward in the sky, will come to a standstill, move slightly westward, stand still again, and then continue eastward.

A solar day (i.e., from sunrise to the next sunrise) lasts two Mercury years. During that time, Mercury rotates three times on its axis relative to the stars, i.e. three sidereal days pass.

[http://www.messenger-education.org/Interactives/ANIMATIONS/Day On Mercury/day on mercury.php](http://www.messenger-education.org/Interactives/ANIMATIONS/Day%20On%20Mercury/day_on_mercury.php)

**Summary of "What's Up?" to be presented on 23<sup>rd</sup> March 2016  
by Michael Poll**

**The Moon**

The Moon moves from east to west as the Earth spins on its axis, as does the Sun, but the Moon also moves slowly eastwards in its orbit around the Earth. The eastwards movement means that the Moon is further east from one night to the next, and consequently rises about an hour later each night. The Moon completes a circuit of the sky in one month, which is its orbital period around the Earth. As it moves around the sky, it can be used as a signpost to identify objects that it passes, such as bright planets and bright stars.

**Moon near bright stars**

March 24<sup>th</sup> – 25<sup>th</sup> near Spica (brightest star in Virgo) (all night)  
 April 10<sup>th</sup> near Aldebaran (brightest star in Taurus) (early evening sky)  
 April 21<sup>st</sup> near Spica (evening sky)

**Morning Sky (east before sunrise)**

**Venus**

Venus is currently in the east before sunrise, & will be visible in the morning sky until about May 2016. From about the beginning of April it will be rising in the morning twilight and will not be so easy to see. The Moon will be near it on April 6<sup>th</sup> (look between about 5.30 am and 6 am). Venus will pass behind the Sun on June 6<sup>th</sup> (superior conjunction) and will become visible in the evening sky after sunset towards the end of July.

**Evening Sky**

**Jupiter**

Is in Leo. It is a bright white object, not quite as bright as Venus, but brighter than any star. It is in the north east in the early evening, and is visible for most of the night during April. It will be visible in the evening sky until about the end of August  
 The Moon will be near Jupiter on April 17<sup>th</sup> & 18<sup>th</sup>.

**Mars**

Mars becomes bright in the night sky about every two years. When it is at its closest to Earth (near opposition) it can be as bright as Jupiter. The brightest oppositions occur in a 15 - 17 year cycle, and the next two apparitions (May 2016 and July 2018) will be the bright ones. In 2016 Mars will appear very bright during late April, May and early June. It will be at opposition (i.e opposite the Sun in the sky as viewed from Earth) on May 22<sup>nd</sup>, when its magnitude will about -2.0  
 During April May and June, Mars will be in the sky for most of the night.  
 The Moon will be near Mars on March 28<sup>th</sup> (they rise at about 10.00pm) and April 24<sup>th</sup>  
 Mars will be quite close to Saturn during March, April and May, with Saturn to the east (right when facing north).  
 Mars and Saturn are also near the bright star Antares, the brightest star in Scorpius

**Saturn**

Saturn is in the evening sky during from March until early November. It rises south of east at about 9.30 pm at the end of March. It will be in the sky for most of the night during May and June. (Opposition is on June 3<sup>rd</sup>).  
 The Moon will be near Saturn on the late evening of March 29<sup>th</sup> and on April 25<sup>th</sup>

**Continued on next page.**



★ **Mercury** ★

Is in the evening twilight during April, but is not easily visible.

★ **(Selected) Constellations visible during April: Sequence repeats from year to year** ★

★ **April :South** Carina, Vela, (False Cross), Crux, Centaurus, ★

**North** Canis Major, Gemini, Cancer, Leo. ★

★ **East** Virgo ★

★ **May : South** Carina, Vela, (False Cross), Crux, Centaurus, Libra, Scorpius ★

**North** Leo, Virgo Boötes, ★

★ **June :South** Carina, Vela, (False Cross), Crux, Centaurus, Libra, Scorpius, ★

**North** Sagittarius ★

Virgo, Boötes, Corona Borealis Ω ★



★ **Report for Observing Evening on Friday 19<sup>th</sup> February 2016** ★

★ **- by Michael Poll** ★

★ This was quite a good evening's viewing. There were 20 or so people, with quite a ★  
 ★ few visitors, and half a dozen telescopes, and most of the viewing was the showing of a few ★  
 ★ selected objects for the visitors to see. The sky was not good enough for any serious work, ★  
 ★ but good enough for a sightseeing tour. ★

★ The 11 day old Moon attracted attention first. We showed the naked eye "Rabbit's ★  
 ★ Ears" to the children present, and pointed out Mare Crisium, a spot near the limb that is ★  
 ★ also visible with the naked eye. Various dimensions are quoted for this feature – the current ★  
 ★ edition of Sky and Telescope (February 2016) gives it at 575km x 430km. To the celestial ★  
 ★ east of the Moon (lunar west) we noted Mare Imbrium, and Sinus Iridium. A prominent cra- ★  
 ★ ter close to the mountains that reach to the shore of Iridium was seen – this is Bianchini, ★  
 ★ which has not been previously mentioned in these observing evening notes. [Francesco Bi- ★  
 ★ anchini (1662 – 1729) was an Italian astronomer]. We also showed Copernicus and Plato. ★  
 ★ Those seeing the Moon through a telescope for the first time were most impressed. ★

★ Naked eye stars noted in the north were Capella and Aldebaran, and those in Orion, ★  
 ★ and we pointed out the colour difference between Betelgeuse and Rigel. Eastwards and ★  
 ★ higher up were Procyon, Castor and Pollux and Sirius. Nigel showed the Pleiades in bin- ★  
 ★ oculars. Fezi asked to for Canis Major to be pointed out. We noted the 40° gap between ★  
 ★ Sirius and Canopus, and mentioned the fact that the line joining Sirius and Canopus when ★  
 ★ extended half as far again, points to the Large Magellanic Cloud, however the latter was not ★  
 ★ visible to the naked eye. ★

★ There had been intermittent cloud during the evening and at 8.15 pm it suddenly ★  
 ★ closed up completely, which abruptly terminated the observing evening! Ω ★



**NOTICE BOARD**

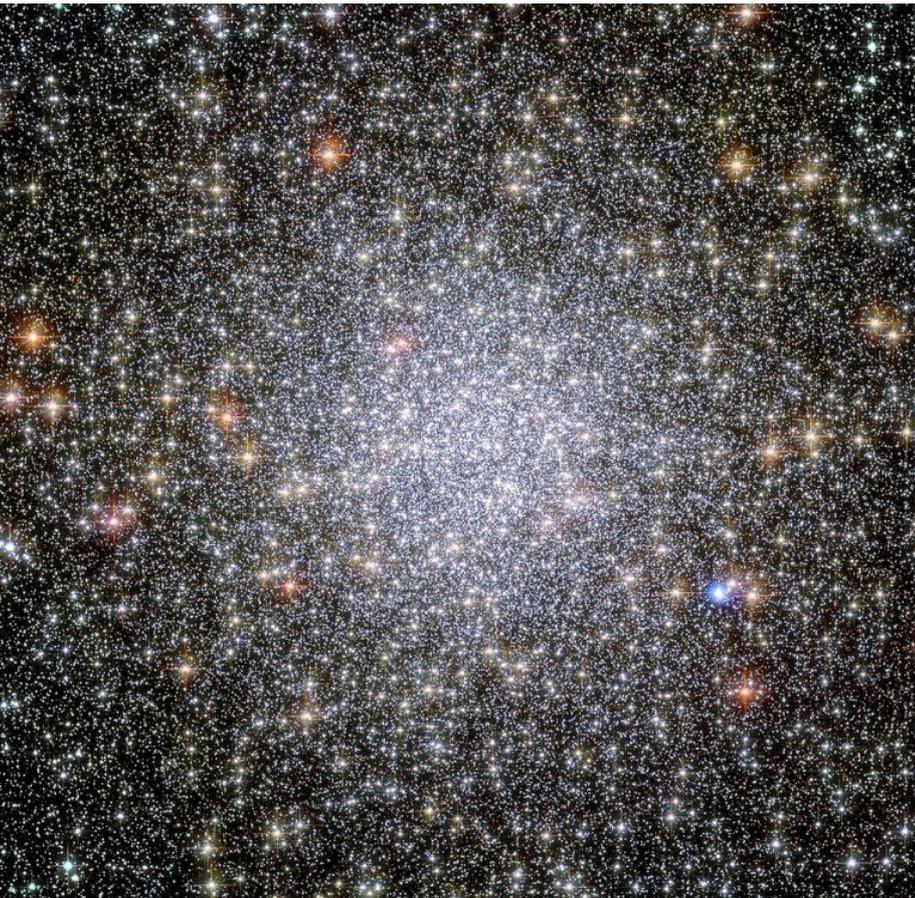
★ **"Gateway to space" exhibition.** Sandton Centre, 1 June - 31 July  
 2016. <http://gatewaytospace.co.za/en/home/>

**NGC 104: A splendid globular cluster in Tucana - by Magda Streicher**

Globular clusters are not only among the most exceptional celestial objects, they are also among the most fascinating. I usually stand amazed at the intensity of the clusters, their impact and size that give them the appearance of having been compressed into a perfect sphere.

NGC 104 (aka 47 Tucanae), one of about 150 in our galaxy, is a typical globular cluster with approximately a million stars brought together through gravity. In the heart of a globular cluster as many as a thousand stars may be clustered together that could be spanning a few light years in width. Like most globulars, NGC 104 resides on the outskirts of our galaxy, approximately 30 000 light years removed from our solar system. Globular clusters are old objects, and NGC 104, as one of the larger ones, is between 12 and 14 billion years old. In about 1755, the French pioneer astronomer Nicholas-Louis de Lacaille first recognized it to be a cluster and not a single star.

Our deep sky director, Auke Slotegraaf, sees NGC 104 as a brilliant haze of starlight with a casual glance through binoculars. His 10-inch at 30x shows this incredible object as made up of an innumerable host of bright points gathered into a round blaze of unresolved stars in the cotton button centre. In his wide-field eyepiece the unevenly distributed field stars are visible, and as one looks at the cluster from outside to inside, the star density gradually increases, then the stars suddenly gather into a nucleus. This nucleus is a very prominent feature that immediately draws one's eyes to it, with the result that you see the outer region as a widely scattered star field with a bright disc in the centre that glows warmly with a slight tinge of yellow. Observed at 200x the cluster exhibits two interesting features. Auke explains that the most prominent one is a lesion on



the eastern side of the nucleus. This is a dark gap about a half to a third of the width of the core, extending conspicuous streamers of stars leading from the nucleus into the second zone. There are at least four of these streamers, two starting from the lesion, and two originating directly opposite.

One of the most exceptional objects in the night sky, which I can only begin to describe as three-dimensional, becomes a shimmering ball of a thousand and one stars through my 12" S/C telescope. The inner large core displays a grainy texture (12" S/C - 95x), round in shape with crowded minute stars fighting for a place, the brilliant focus that makes NGC 104 so special. The softer second envelope bursts around the core and runs out to a soft

shade of sandpaper. Sprinkling star splinters explode in a haze that fills the field of view with delight. With even higher power (12" S/C - 218x) you become one of the cluster members floating along in space – it's the ultimate pleasure to be part of the night sky! Can we say more? **Ω**

Object	Name	Type of object	RA	DEC	MAG	SIZE
NGC 104	47 Tuc	Globular cluster	00.24.6	-72° 05'	3.8	30.9'

## Feature of the month: Supernova in Centaurus A - by Pierre Lourens



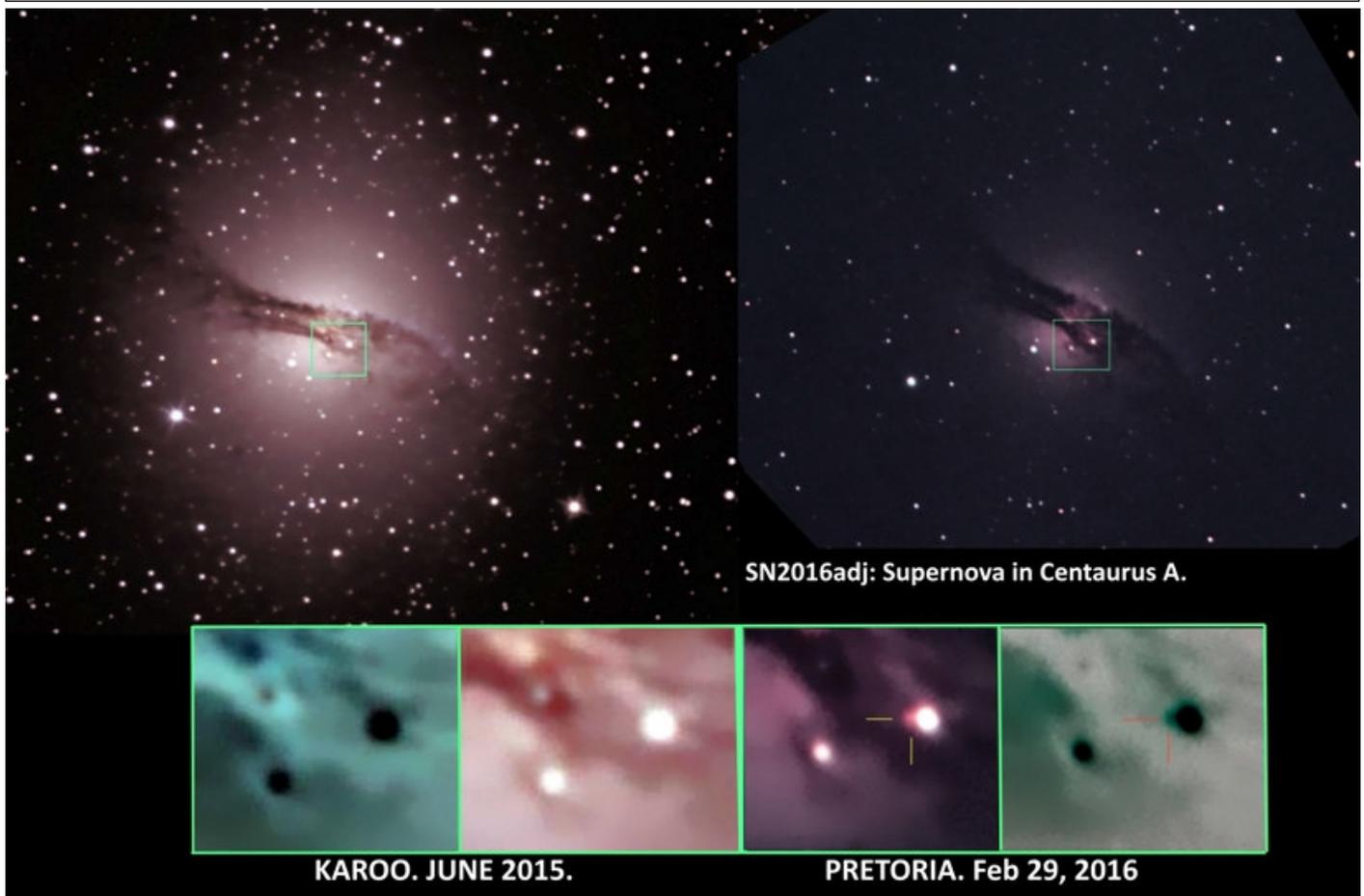
A supernova was recently discovered in a nearby galaxy known as Centaurus A,  $13 \pm 3$  million light-years away. The supernova was dubbed **SN2016adj**.

SALT (**S**outh **A**frikan **L**arge **T**elescope) near Sutherland in the Western Cape was (as far as is known) the first major telescope taking a spectrum of the supernova just hours after its discovery on the night of February 8, 2016. More spectra were taken on February 9, and are being analyzed by SALT partners at Dartmouth and Rutgers Universities in the U.S.A.

Read more and see hot-off-the-telescope **Salticam** images of the central regions of the Centaurus A galaxy with the supernova at: <http://www.salt.ac.za/news/sn2016adj-supernova-in-centaurus-a/>

See also the photographs below.  $\Omega$

### Supernova SN2016adj in Centaurus A. Photographs and annotations by Johan Moolman.



### Astronomy-related images and video clips on the Internet

- **NASA spacecraft's epic 10 years of Mars: photos.** Photographs taken by Mars Reconnaissance Orbiter. <http://news.discovery.com/space/history-of-space/memorable-mars-epic-photos-beamed-back-by-nasa-orbiter-150814.htm>
- **Images made by Curiosity, one of the rovers on Mars.** <http://news.discovery.com/space/get-immersed-in-curiositys-360-degree-mars-dune-160210.htm>

## Noteworthy astronomy-related articles on the Internet

### Solar system

- **Is 'Planet 9' a second Kuiper belt?** Researchers present an alternative theory: not a planet, but many small objects. [http://earthsky.org/space/is-planet-9-a-second-kuiper-belt?utm\\_source=EarthSky+News&utm\\_campaign=280970e899-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-280970e899-394671529](http://earthsky.org/space/is-planet-9-a-second-kuiper-belt?utm_source=EarthSky+News&utm_campaign=280970e899-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-280970e899-394671529)
- **Chelyabinsk meteor mystery 3 years later.** It's been 3 years since the dazzling fireball over Chelyabinsk, Russia, and its aftereffects in 6 Russian cities. Yet scientists still don't know its origin. [http://earthsky.org/space/chelyabinsk-meteor-mystery-3-years-later?utm\\_source=EarthSky+News&utm\\_campaign=8bcb31f3a4-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-8bcb31f3a4-394671529](http://earthsky.org/space/chelyabinsk-meteor-mystery-3-years-later?utm_source=EarthSky+News&utm_campaign=8bcb31f3a4-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-8bcb31f3a4-394671529)
- **Largest fireball since Chelyabinsk falls over Atlantic.** The biggest fireball since the Chelyabinsk explosion plunged through the atmosphere over the Atlantic Ocean on February 6, 2016. [http://earthsky.org/space/largest-fireball-since-chelyabinsk-falls-over-atlantic?utm\\_source=EarthSky+News&utm\\_campaign=95adafc83c-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-95adafc83c-394671529](http://earthsky.org/space/largest-fireball-since-chelyabinsk-falls-over-atlantic?utm_source=EarthSky+News&utm_campaign=95adafc83c-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-95adafc83c-394671529)

### Exoplanets

- **Moons might hold key to finding E.T. life.** As the list of known planets beyond our solar system grows, the search for their moons is intensifying. Why exomoons might be the key to E.T. life. [http://earthsky.org/space/moons-might-hold-key-to-finding-e-t-life?utm\\_source=EarthSky+News&utm\\_campaign=7701a268fd-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-7701a268fd-394671529](http://earthsky.org/space/moons-might-hold-key-to-finding-e-t-life?utm_source=EarthSky+News&utm_campaign=7701a268fd-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-7701a268fd-394671529)

### Supernovae

- **This date in science: Closest supernova since 1604.** Awesome images of Supernova 1987A, a colossal stellar explosion. Plus insights gained from study in the years since then. [http://earthsky.org/space/supernova-1987a-closest-brightest-supernova-star-death?utm\\_source=EarthSky+News&utm\\_campaign=192a42ff1b-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-192a42ff1b-394671529](http://earthsky.org/space/supernova-1987a-closest-brightest-supernova-star-death?utm_source=EarthSky+News&utm_campaign=192a42ff1b-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-192a42ff1b-394671529)

### Observing

- **Castor: six stars in one.** Castor appears as a single star, but it's actually a famous multiple star system, containing three pairs of binary stars. [http://earthsky.org/brightest-stars/best-castor-brightest-second-magnitude-star?utm\\_source=EarthSky%20News&utm\\_campaign=280970e899-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-280970e899-394671529](http://earthsky.org/brightest-stars/best-castor-brightest-second-magnitude-star?utm_source=EarthSky%20News&utm_campaign=280970e899-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-280970e899-394671529)
- **Procyon, the Little Dog Star.** The Dog Star, Sirius, is easy to spot because it's the sky's brightest star. Procyon – the other Dog Star – is always near its brighter brother on the sky's dome. [http://earthsky.org/brightest-stars/procyon-harbringer-of-the-dog-star?utm\\_source=EarthSky%20News&utm\\_campaign=95adafc83c-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-95adafc83c-394671529](http://earthsky.org/brightest-stars/procyon-harbringer-of-the-dog-star?utm_source=EarthSky%20News&utm_campaign=95adafc83c-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-95adafc83c-394671529)
- **Beehive: 1 000 stars in Cancer.** You might notice it a smudge in a dark sky, with three times the moon's diameter. It's really a wondrous cluster of stars called the Beehive, or M44. [http://earthsky.org/clusters-nebulae-galaxies/praesepe-beehive-cluster?utm\\_source=EarthSky+News&utm\\_campaign=7701a268fd-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-7701a268fd-394671529](http://earthsky.org/clusters-nebulae-galaxies/praesepe-beehive-cluster?utm_source=EarthSky+News&utm_campaign=7701a268fd-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-7701a268fd-394671529)
- **Twin comets approach closely in March.** Two comets in similar orbits are approaching Earth. One of them – comet P/2016 BA14 (Pan-STARRS) – will be the closest comet in 246 years! [http://earthsky.org/space/twin-comets-approach-closely-in-march?utm\\_source=EarthSky+News&utm\\_campaign=192a42ff1b-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-192a42ff1b-394671529](http://earthsky.org/space/twin-comets-approach-closely-in-march?utm_source=EarthSky+News&utm_campaign=192a42ff1b-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-192a42ff1b-394671529)

[EarthSky News&utm\\_medium=email&utm\\_term=0\\_c643945d79-192a42ff1b-394671529](http://earthsky.org/news/EarthSky+News&utm_medium=email&utm_term=0_c643945d79-192a42ff1b-394671529)

## History of astronomy

- **This date in science: happy birthday, Nicolaus Copernicus.** Copernicus broke open the medieval idea of an enclosed, Earth-centered Universe. He set the stage for all of modern astronomy. [http://earthsky.org/human-world/this-date-in-science-happy-birthday-nicolaus-copernicus?utm\\_source=EarthSky+News&utm\\_campaign=8d6cdd9cab-EarthSky News&utm\\_medium=email&utm\\_term=0\\_c643945d79-8d6cdd9cab-394671529](http://earthsky.org/human-world/this-date-in-science-happy-birthday-nicolaus-copernicus?utm_source=EarthSky+News&utm_campaign=8d6cdd9cab-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-8d6cdd9cab-394671529)

## Spaceflight

- **Record number of astronaut applications.** Do you want to become an astronaut? Well, NASA received applications from more than 18 300 people to join NASA's 2017 astronaut class. And only between 8 and 14 will be selected. [http://earthsky.org/space/record-number-of-nasa-astronaut-applications?utm\\_source=EarthSky+News&utm\\_campaign=d32eeff591-EarthSky News&utm\\_medium=email&utm\\_term=0\\_c643945d79-d32eeff591-394671529](http://earthsky.org/space/record-number-of-nasa-astronaut-applications?utm_source=EarthSky+News&utm_campaign=d32eeff591-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-d32eeff591-394671529)

## **Basics: The Ritchey - Chrétien telescope - by Pierre Lourens**

A Ritchey - Chrétien telescope (RCT) is a specialized variant of the Cassegrain telescope. (See: "Basics" in the January newsletter.) A RCT has a convex hyperbolic secondary mirror, just like the Cassegrain telescope. But the primary mirror of a RCT is concave **hyperbolic**, whereas that of a Cassegrain is concave **parabolic**.

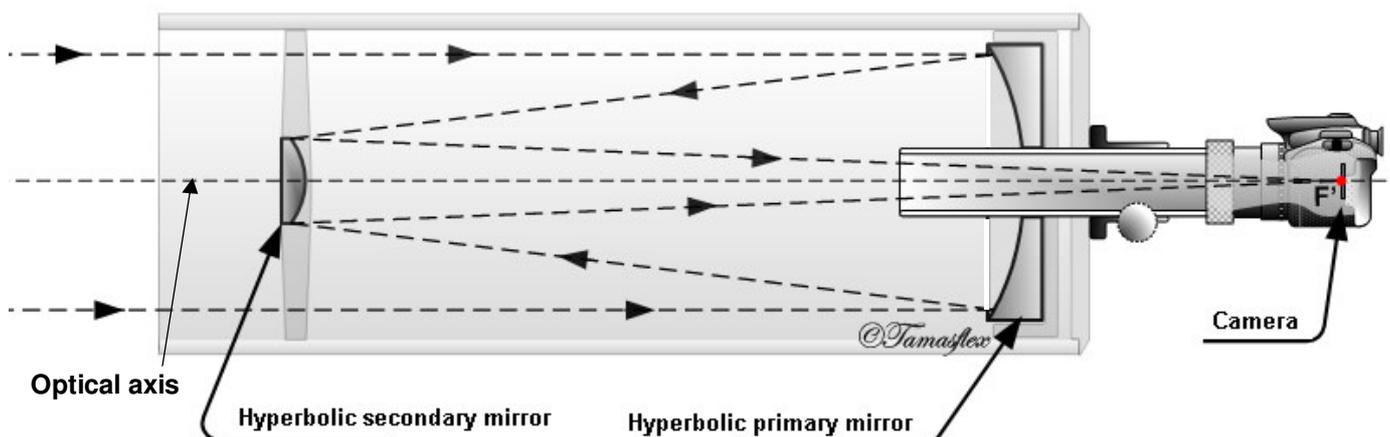
Since the mid 20th century, a majority of large professional research telescopes have been built with Ritchey - Chrétien configurations. Some well-known examples are the Hubble Space Telescope, the twin Keck telescopes and the ESO Very Large Telescope.

The Ritchey - Chrétien telescope was invented in the early 1910's by American astronomer George Ritchey and French astronomer Henri Chrétien.

Like the Cassegrain telescope, the RCT has a very short optical tube assembly and compact design for a given focal length, because the optical path is folded.

The optical design with a concave and convex mirror tends to cancel the aberrations such as coma of the individual mirrors. The arrangement of mirrors gives an accessible position of the focus which is conveniently on the optical axis and at the rear of the telescope. This is convenient for installing equipment such as spectrometers, CCD cameras and photometers at the focus.

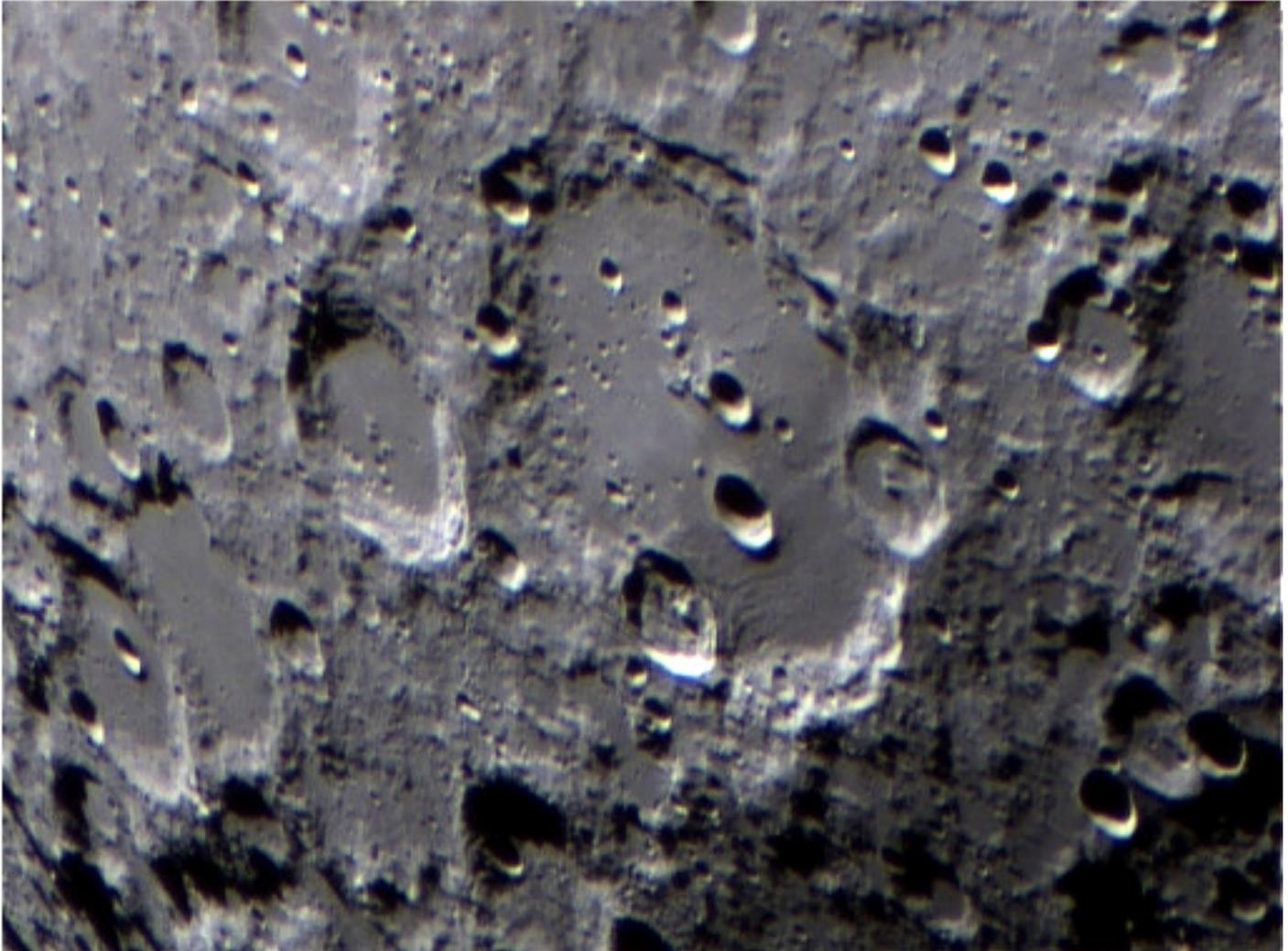
The RCT offers good off-axis optical performance, but amateur-size examples are relatively rare due to the difficulty of mass-production of hyperbolic primary mirrors. The Ritchey - Chrétien configuration is most commonly found on high-performance professional telescopes.  $\Omega$



### Clavius

**Clavius** is the third largest crater on the near side of the Moon that is visible from Earth. It is located in the rugged southern highlands of the Moon. Diameter: 225 km. Depth: 3.5 km. Photograph taken by Johan Moolman.

Technical details: Celestron 8"EDGE HD (2032mm, F10 PLUS 2x Barlow), Meade LX850 mount, Celestron Skyris 445C colour cam. Stacked in RegiStax, PP in Paint.NET.



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 ★ Pretoria Centre committee

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

**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.

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