



# The **PRETORIA CENTRE**

of the

## Astronomical Society of Southern Africa

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

### NEWSLETTER MAY 2017

#### Next meeting

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

**Date and time:** Wednesday 24 May at 19h15.

**Programme:**

- **Beginner's Corner:** "Feedback on the Karoo Star Party 2017" by Johan Moolman.
- **What's Up?** by Fred Oosthuizen.
- 10 minute break — library will be open.
- **Main talk: "Astronomy in Thailand" by Gerhard Bloemhof.**
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Michael Moller.

#### Next observing evening

Friday 19 May 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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## Chairperson's Report for the meeting of 26 April 2017 by Michelle Ferreira

Michelle Ferreira chaired the meeting and we were a small but cosy crowd of 18 attending. This was due to the other 'star gazers' having a great time attending the Karoo Star Party in Britstown.

For a change Michael Poll started the meeting off with What's Up for the month of May and thereafter went straight into his topic for the monthly Beginners Corner. This was a discussion of the crater Copernicus. Crater morphology is divided into simplex or complex craters. The crater at Tswaing near Pretoria is an example of simple crater. Complex craters on earth start at greater than 4km, however on the moon these start at about 15-20km diameter. The Vredefort crater is such a complex crater on Earth. On the moon are Arzachel with a diameter of 97km, depth of 3.6km and central peak of 1.5km; Alphonsius with a diameter of 120km and Ptolemaeus with a diameter of 153km. The crater Copernicus is estimated to be 800 million years old. It is 93 km in diameter and has three central mountains about 900 metres high.

The main talk, presented by Neville Young was termed the Travels and Travails of Tycho and Kepler. Kepler was German and born on 27<sup>th</sup> December 1571 in the Free Imperial City of Weil der Stadt, Holy Roman Empire. He was a key figure in the 17<sup>th</sup>-century scientific revolution and his fields were astronomy, astrology, mathematics and natural philosophy. He is best known for his laws of planetary motion. He was influenced by Nicolaus Copernicus and Tycho Brahe. Kepler lived during a period of the Roman Empire's history which were very difficult times.

Neville demonstrated the difficult religious times of the period, the difficulties experienced when travelling, not being paid for services, difficulty to publish works, etc. Kepler was a protestant and accepted the position as teacher of mathematics and astronomy at the Protestant school in Graz in April 1594, at the age of 23. In the first years of his marriage to Barbara Muller they had two children, both whom died in infancy, though they later had three more children. In those times the infant mortality rates were high and as it was for adults also. Healing was done through herbs or the letting of blood. After refusing to convert to Catholicism, Kepler and his family were banished from Graz. Travelling between cities from Graz to Prague was mostly done on foot and could take weeks to complete. Kepler moved with his household to Prague in 1600. He spent 1600-1612 in Prague working for Tycho Brahe. After Tycho's unexpected death in October 1601, Kepler spent the next 11 years as imperial mathematician and these would be the most productive of his life. Whilst he was still the mathematician to the Emperor, he was granted permission to move to Linz in 1612.

Whilst in Linz Kepler was teaching at the district school and providing astrological and astronomical services. In 1613 Kepler married for the second time. After the death of his first wife, Kepler had considered 11 different matches over two year, a decision process formalized later as the marriage problem. The first three children of this marriage died in childhood but three more survived into adulthood. It was however during his time in Linz, that Kepler had to deal with the accusation and ultimate verdict of witchcraft against his mother. In 1623, Kepler at last completed the Rudolphine Tables, due to publishing requirements of the emperor and negotiations with Tycho Brahe's heir, it would not be printed until 1627. Religious tension, the root of the ongoing Thirty Years' War, once again put Kepler and his family in jeopardy. In 1625, agents of the Catholic Counter-Reformation placed most of Kepler's library under seal, and in 1626 the city of Linz was besieged. Kepler moved to Ulm, where he arranged for the printing of the Tables at his own expense.

In 1628 Kepler became an official advisor to General Wallenstein. He provided astronomical calculations to Wallenstein's astrologers. In his final years, Kepler spent much of time travelling, from the imperial court in Prague to Linz and Uml to a temporary home in Sagan and finally to Regensburg where he died aged 58 on 15 November 1630. Neville left us with the thought that if Kepler could have done that much in a lifetime overcoming such a multitude of obstacles, how much more can we aspire to under much less challenging circumstances.  $\Omega$

Summary of "What's Up?" to be presented on 24 May 2017  
 - by Fred Oosthuizen

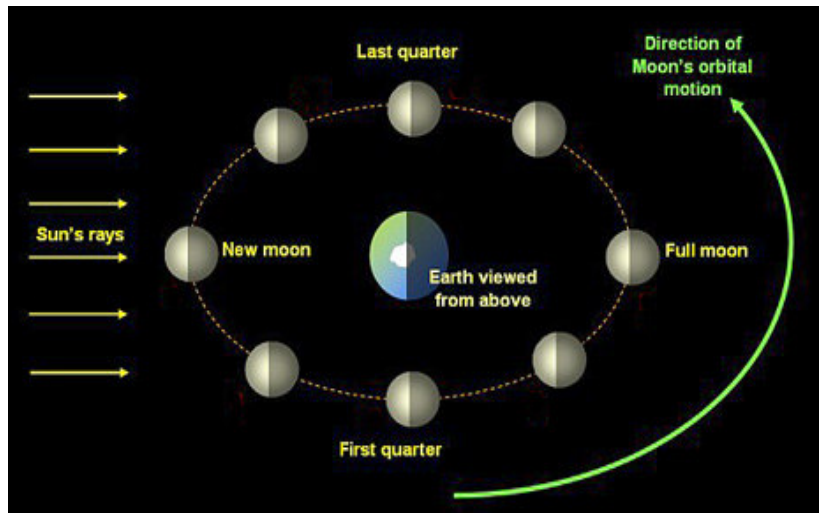
What's up in June 2017:

MOON PHASES

- FIRST QUARTER: Thursday 01 -12h42 UTC.
- FULL MOON: Friday 09 - 13h10 UTC.
- LAST QUARTER: Saturday 17 -11h33 UTC.
- NEW MOON:: Saturday 24 - 02h31 UTC.

June 21: June Solstice

Earth will be tilted toward the Sun, which will have reached its northernmost position in the sky and will be directly over the Tropic of Cancer at 23.44 degrees north latitude. This is the first day of summer (summer solstice) in the Northern Hemisphere and the first day of winter (winter solstice) in the Southern Hemisphere.



MERCURY is moving through the constellations Pisces/Aries and can be seen in the morning sky for

about an hour during the first week of June. It is in solar conjunction on the 21<sup>st</sup>. Besides a number of double stars and the deep red coloured variable TX Piscium Carbon star. There are a number of faint galaxies the most prominent is the face on spiral galaxy M74 in Pisces and the spiral galaxy NGC772 at magnitude 10 in Aries.

VENUS is at its greatest western elongation and is 45.9 degrees from the Sun on June 03. It is very prominent in the morning sky. This is the best time to view Venus since it will be at its highest point above the horizon which is about 3 hours before sunrise.

MARS will be very difficult to see in the evening sky as it approaches solar conjunction.

URANUS is in conjunction with Venus and at magnitude +5.9 and is bright enough to be seen with the naked eye from a dark-sky site.

NEPTUNE is in the constellation Aquarius and is visible from midnight until sunrise.

Aquarius is host to the finest globular cluster in the sky, M2, which is 50,000 light years away with a diameter of approximately 150 light years. It also hosts two planetary Nebulae. The Helix Nebula NGC7293(C63) which is regarded as the largest of all planetary nebulae which is also the closest planetary nebula to our solar system and the "Saturn Nebula" NGC7009(C55) so called because it resembles the planet Saturn.

JUPITER can be viewed from Sunset until about midnight. It is at present in the constellation Virgo close to the bright star Spica. Of the thousands of galaxies in Virgo there are 90+ which can be viewed with an average backyard telescope. The "Sombrero Hat" galaxy being one of the favourites at a dark sky outing.

SATURN is in the constellation Ophiuchus which is rich in Globular clusters i.e. M9/10/12/14/19/62 and 107 which are well worth viewing. Just southeast of Ophiuchus the constellation Sagittarius which houses the "Teapot" and a host of open and closed star clusters such as M 16/17/18/20/21/22/23//25/28/54/55//69/70 and 75 it also contains a large number of NGC numbers. Ω



★ **Report for Observing Evening on Friday April 21<sup>st</sup> 2017 - by Michael Poll** ★

★ This was a very pleasant clear-sky evening, turning just a little chilly later. About 10  
★ or 12 people were present at various times during the evening - some came early and left  
★ early, some came later and left later. We welcomed some first time visitors.

★ The sky conditions were much better than last month – in March we could not see  
★ Porrima (Gamma Virginis, magnitude 2.8) with the naked eye, but this time were able to  
★ see it, and, for example, we could see Delta Virginis at magnitude 3.4.

★ Jupiter was the only planet visible, quite high up in the east. All four Galilean moons  
★ were visible early on, with Io close in to the west of Jupiter. Not long after observing  
★ started, Io disappeared into occultation i.e it moved into Jupiter’s shadow. Although the dis-  
★ appearance was not observed, it would have occurred before Io reached Jupiter’s limb.

★ Amongst other things, we did a tour of double stars and clusters, and more or less  
★ repeated the tour for the later comers.

★ Double star viewing started with Porrima which has a period of 169 years and, as  
★ viewed from Earth the two components were at their closest in 2005. For some years it  
★ was not possible to split the two in our local telescopes, and we have been looking at them  
★ at intervals to see if they had opened up enough to appear separated. Our observing eve-  
★ ning records over the past few years suggest that we sometimes thought we could split  
★ them, and sometimes thought we couldn’t split them. However, on this evening, although  
★ very close, the star could quite easily be seen as double in a 6 inch telescope. Other dou-  
★ ble stars were Castor and Alpha Centauri. Both of the latter have recently opened up from  
★ a close approach as viewed from Earth – Castor closed up for about 30 years. (See foot-  
★ note 1); the Alpha Centauri pair appeared close to each other in 2015 although they could  
★ still be separated. (See footnote 2). We also looked Alpha Crucis, which is a triple, the first  
★ split was much easier than those we had shown so far, but the second split (of the bright  
★ component) is not so easy, but our visitors were able to see it. (See also Footnote 3).

★ We discussed star colours, and pointed out a few comparisons between red stars  
★ and blue or blue /white stars. There were a number of convenient duos to compare: we  
★ looked at Gamma Virginis (white) and Delta Virginis (a red giant), Rigel and Betegeuse,  
★ and Alpha and Beta Centauri. The relationship between star colour and surface tempera-  
★ ture was explained.

★ In a similar way, we explained about star brightnesses, and again there are duos of  
★ similar brightness, but disparate distances – the examples used were Sirius and Canopus,  
★ (8 and 310 light years away); Betelgeuse and Rigel (600+ and 800+ light years away, refer-  
★ ences vary), and Alpha and Beta Centauri (4.3 and 390 light years away). We explained  
★ that we see apparent brightness, which depends on the actual distance and the actual  
★ brightness.

★ We were able to pick out a variety of open clusters. This sort of cluster always pro-  
★ vides good viewing. We looked at IC2602 – the Southern Pleiades. The brightest star in  
★ this cluster is Theta, at magnitude 2.8. Quite close by on the sky is NGC 3532 also known  
★ as the Wishing Well cluster. Even with the light pollution we could see many stars in this  
★ group. NGC4755, the Jewel Box was also much appreciated and we showed how it could  
★ easily be located near Beta Crucis. Omega Centauri was the only example of a globular  
★ cluster that we looked at. It was not resolved in a 6 inch telescope.

★ We did some naked eye pointing out of constellations – Orion was getting low down  
★ in the west, we showed Geminin and Leo, and Spica, the brightest star in Virgo. In the  
★ south the “crosses” were well placed – Southern Cross, Diamond Cross and False Cross.

★ A question about “finding south” got us into a discussion about the south celestial  
★ pole (SCP). It was pointed out that the SCP would get higher as one travelled south, the  
★ extreme example would be at the south pole, when the SCP would be directly overhead,





★ and in fact, the altitude of the SCP in degrees, is the same as the observer's latitude. Peo-★  
 ★ ple were then able to figure out that, on the equator, the altitude of the SCP is zero de-★  
 ★ grees, i.e it would lie on the horizon. A discussion about telescope mountings followed, as★  
 ★ Michael's 6 inch telescope is on an equatorial mount.★

★ **Footnotes.**★

★ **1** (*Observing Evening report, March 2009*). Castor, (the Alpha star of Gemini, but not★  
 ★ the brightest star in the constellation) now shows a tight bright white pair - Castor A and★  
 ★ Castor B. This binary has only opened up in the last few years, having been too close to★  
 ★ separate in small telescopes for some decades. Norton's Star Atlas for **1966** (15<sup>th</sup> Edition)★  
 ★ describes Castor as "*A very fine object*", but in a footnote it states "*A very fine double and★  
 ★ binary star.....The component stars were at their widest apart in about 1880; they are★  
 ★ now closing and will do so for some years*". Norton's for **1973** (16<sup>th</sup> Edition) states that the★  
 ★ pair is "*.....closing; not now easy with small apertures*". A and B have a period of 467 years★  
 ★ (the period depends a lot on which book you read!). They are currently 4.5 arc seconds★  
 ★ apart, and the gap will widen to a maximum of 7.3 arc seconds in 2085.★

★ **2** As viewed from Earth, the two stars [Alpha and Beta Centauri] were last at their★  
 ★ closest in 1957. They were at their widest in 1980, and so have been closing ever since★  
 ★ then. This does not mean that they will continue closing until reaching periastron in 30★  
 ★ years' time. From our viewpoint, they closed up until 2015, and will be opening up again★  
 ★ until 2029, and thereafter start closing again to their closest, which occurs in November★  
 ★ 2037.★

★ **3** In 2008, at **Space.com** the writer found the following statement about double stars:★  
 ★ "*There is an interesting rule about the colours of telescopic double stars. If the stars of the★  
 ★ pair are equally bright, they have the same colour. If they are unequal in brightness, they★  
 ★ have different colours. If the brighter star is the redder of the two, as in the case of Albireo,★  
 ★ it must be a giant star; if it is the bluer, then it is what astronomers call a main sequence★  
 ★ star, like our Sun*". Ω★



**Request for contributions to "Beginner's Corner" at the monthly meetings of the Pretoria Centre of ASSA - by Michael Poll**

As with many societies such as ours, there is a recurring problem of finding speakers. At the moment in the Pretoria Centre, one problem is to find presenters for "Beginner's Corner". Members will notice that the presenter is always a Committee member.

The Centre Committee would like to have more people involved in these presentations, and to that end an appeal is made to members to offer contributions. In reply to the question "I do not know what to talk about" a list of topics and ideas from which people can choose is on pages 7 and 8 in this newsletter. These are suggestions, one can generalise about a large topic, or go into some detail about a part of a topic.

Note that "Beginner's Corner" presentations should be for only 20 minutes, (25 minutes maximum), so a presentation is an exercise in conciseness – only the bare bones need be covered! In passing, be aware that the same problems and principles apply to "What's Up?" !

If anyone would like to contribute please e-mail the Chairman, Johan Smit ([johanchsmit@gmail.com](mailto:johanchsmit@gmail.com)) with a copy to Michael Poll ([pollmnj@icon.co.za](mailto:pollmnj@icon.co.za)). You may name a date or dates that would be convenient for you to present. Ω

## Observing: A slightly different nebula - by Magda Streicher

The Orion constellation is well-known and well-loved and is characterised particularly by the variety of known nebulae found within its borders. However, NGC 1999 is a diffuse emission and reflecting nebula with a difference that makes it very special in its own right. Slightly more than one degree south-southeast of M42 this small, annular form of NGC 1999 makes this gaseous cloud easy to mistake for a planetary nebula. However, the dark cloud's roughly triangular shape reveals that it is not a planetary nebula. The illuminating variable star V380 Orionis is easily seen within the nebula. However, the nebula, which expands slightly northwards, gives the star an off-centre appearance. The surrounding bright nebulosity within the cloud is most intense in this sun's vicinity. The use of filters can degrade the view slightly, seeing that it is a reflection nebula.

The real beauty in this nebula is the well-defined inky black V-shaped spot that can be seen towards the northern edge of the nebula. The larger 21' x 18' nebulosity surrounding NGC 1999 is most probably the indicated IC 427. Around 12' further north of NGC 1999 the soft, small nebula IC 428 can be seen with care around an 11-magnitude star, with the nebula slightly hazier towards the northwestern edge. However, the situation regarding IC 428 is not as clear. Various amateurs also associate IC 428 with [B77] 120 (Bernes 120), a 2'-diameter nebula 15.8' north of NGC 1999. These fainter objects around NGC 1999 were found on HCO photographs by Williamina Fleming.

NGC 1999 was discovered by William Herschel, who described it as a magnitude 10/11 star incorporated in a nebula. Presumably all Herschel saw was the brighter 2'x2' nebula surrounding the variable star V380 Orionis

I took up the challenge of my friend Derck Smits to look out for bow shocks, stellar jets, or stars fainter than 14 magnitude at indicated positions around NGC 1999, which will form the discussion in next month's essay.  $\Omega$

Name	Object	RA	Dec	Magnitude	Size
NGC 1999	Diffuse emission reflecting nebula	05h 36.5m	-06° 42'	11	2' X 2'



**Left:** The NGC 1999 Nebula. Image made by the Mount Lemmon Sky-Center Schulman Telescope.

**Below right:** The inky black V-shaped spot in the nebula. Image made by the HST.



**SUGGESTED BEGINNERS CORNER TOPICS - by Michael Poll**

- Day and night, including solar day and sidereal day
- Movement of the Earth around the Sun on an annual basis in order to explain north-south.
- Movement of the sun and the seasons. – the ecliptic and the analemma.
- Movements of the Moon to account for its phases and its daily movement across the sky. Libration
- Rising and setting of the stars and why different stars are seen at different times of the year.
- The concept of celestial poles and the special case of circumpolar stars. Effect of change in latitude. How to find the south celestial pole. Obtain a compass direction from the stars
- Explain magnitude as applied to the brightness of celestial objects and the factors affecting apparent brightness. List the brightest stars, comparing apparent magnitude with distance
- Factors affecting the varying magnitudes of the planets. Albedo.
- Lunar geology (properly called selenology)
- Crater morphology – simple and complex craters with examples
- Lunar geography ('selenography').
- Mountainous areas compared with the maria: types rock and formation of each type of landform.
- Introduction to the Lunar 100.
- Identification of the planets by their naked eye appearance and visibility
- Analyse the Sky Guide rise and set chart
- Explain the movements of the planets
  - (a) those which move inside the orbit of the Earth
  - (b) those which move outside the orbit of the Earth
- Ellipses, properties of ellipses.
- Kepler's Laws – history and applications. Historical determination of the length of the astronomical unit
- Eclipses, transits and occultations. Historical events
- Angular measure
- Conjunctions
- Comets and meteors. Historical comets and meteor showers.
- Origins of meteor showers
- Kuiper Belt comets vs Oort cloud comets
- Observation of artificial satellites, (e.g time of sighting, path across the sky, and brightness).
- Where to get information of satellite passes and interpretation of the information (e.g Heavens Above).
- Altitude and azimuth, right ascension and declination.
- How to use a star chart
- Determine the position of an object by reading RA and Dec off a star chart.
- Conversely – given the RA and Dec, find where the object is on a star chart
- Sources and types of sky maps. Planispheres
- The constancy of the constellation shapes but the differing orientation
- "Summer" constellations (November - March) : Using a whole sky map, identify Pegasus, Taurus, Orion, Canis Major, Gemini, Carina, Vela
- "Winter" Constellations (April - October). Using a whole sky map, identify Leo, Crux, Virgo, Bootes, Scorpius, Lyra, Cygnus

- Demonstrate planetarium programmes: e.g features & options: input of location, changing dates and times, co-ordinate grids, constellation lines and names. Star names and choice of magnitudes. Tracking of planets E.g Stellarium
  - Interstellar distances and the speed of light. How to specify interplanetary and interstellar distances. Determination of interstellar distances
  - Visual differences between a star and a planet.
  - Basic features of each of the planets – eg physical characteristics, results from space probes including images and interpretation.
- Subdivide descriptions e.g
- The terrestrial planets comparison of their structures, atmospheres and water content.
  - The gas giants Jupiter & Saturn
  - The ice giants Uranus and Neptune
  - Asteroid classification
- Meteorites - different kind of meteorites, origin of meteorites and what they can tell us.
  - Meteorite Impacts and the likelihood of a future meteorite impact and its possible implications and charting of near earth objects
  - Geology of the Solar System.
  - Electromagnetic radiation – eg types, sources, propagation, detection (including dedicated satellites eg Chandra, IRAS)
  - How the Sun works – early theories; the conversion of Hydrogen to Helium i.e Hydrogen burning reactions : the proton-proton chain & the Carbon Cycle  
Formation of elements heavier than Hydrogen & Helium  
Elements lighter than, but including iron  
Elements heavier than iron
  - Spectroscopes and spectroscopy. – the nature of spectral lines.
  - Star colours: Hertzsprung Russell diagram.
  - Stellar life history
    - Brown dwarfs
    - Red dwarfs
    - Sun like stars (mass 0.5 – 8 x)
    - Massive stars (mass 8x – 15x sun; mass >15 x sun)
  - Deep sky objects eg discovery, classification, physics, examples
    - Double stars
    - Gaseous Nebulae
    - Open Clusters
    - Globular Clusters
    - Galaxies
  - Cosmology: e.g Space-time, black holes, gravitational waves, dark matter, dark energy. 2015 is the 100<sup>th</sup> anniversary of general relativity
  - How binoculars work
  - How a telescope works: refractor, reflector and various reflector configurations e.g Newtonian, Cassegrain, Schmidt Cassegrain, Gregorian with advantages and disadvantages of each sort.
  - Topics from the History of astronomy. E.g .biographies, constellation lore, historical telescope(s)
  - Atmospheric phenomena  $\Omega$

## Astronomy-related articles on the Internet

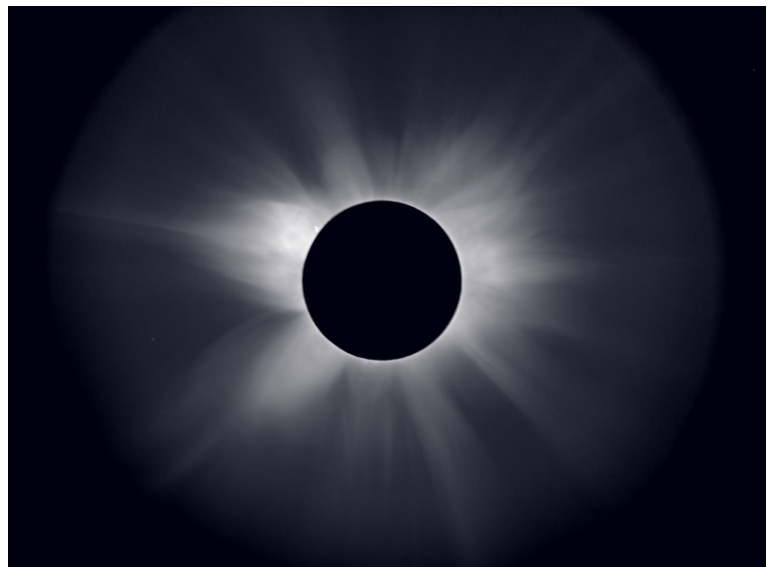
- **Hubble sees a comet breaking up.**  
<http://earthsky.org/space/hubble-comet-332pikeya-murakami-breakup-images>
- **A forming solar system with spiral arms.** Astronomers are beginning to find spiral structure in protoplanetary disks (protoplanetary disks), as theoretically predicted.  
<http://earthsky.org/space/forming-solar-system-spiral-arms-elias-2-27>
- **Life's building blocks found on Ceres.** Spacecraft Dawn, presently orbiting Ceres, has spotted organic molecules - the carbon-containing building blocks of life as we know it - on Ceres. [http://www.space.com/35729-dwarf-planet-ceres-organic-molecules.html?utm\\_source=sp-newsletter&utm\\_medium=email&utm\\_campaign=20170217-sdc](http://www.space.com/35729-dwarf-planet-ceres-organic-molecules.html?utm_source=sp-newsletter&utm_medium=email&utm_campaign=20170217-sdc)
- **Is asteroid 2016 HO3 a second moon?** Although it appears to orbit Earth, it actually orbits the Sun. But its orbit keeps it as a constant companion of Earth, and it'll remain so for centuries to come. See an animation.  
<http://earthsky.org/space/asteroid-2016-ho3-earth-second-moon-constant-companion>
- **Cosmic love: star's heart beats for giant alien planet.** A giant gas planet, with mass equal to 8 Jupiter masses, induces heartbeat-like pulsations in its host star every time it reaches periastron, which occurs every 5.6 Earth-days.  
<http://www.space.com/35697-star-heart-beats-for-giant-exoplanet.html>
- **Monster black hole gorges on record-setting meal.**  
<http://www.space.com/35605-supermassive-black-hole-record-setting-meal.html>
- **Earth-sized planets with lots of water.** A computer simulation suggests that low-mass stars might be a good place to look for Earth-sized exoplanets - in their stars' habitable zones.  
<http://earthsky.org/space/earth-sized-water-planets-proxima-centauri-red-dwarfs>
- **Solar Orbiter: joint mission to study the Sun.** SOHO (Solar and Heliospheric Observatory) is orbiting the Sun at Lagrange point L1. SDO (Solar Dynamics Observatory) is in a circular, geosynchronous orbit around Earth. Now ESA and NASA are planning to launch Solar Orbiter. It will orbit the Sun much closer than SOHO.  
[http://www.space.com/35865-solar-orbiter-facts.html?utm\\_source=sp-newsletter&utm\\_medium=email&utm\\_campaign=20170301-sdc](http://www.space.com/35865-solar-orbiter-facts.html?utm_source=sp-newsletter&utm_medium=email&utm_campaign=20170301-sdc)
- **What are the seasons like on Uranus?** Its spin axis is almost parallel to the plane of its orbit. This results in unusual seasons.  
<http://earthsky.org/space/what-are-the-seasons-like-on-uranus>
- **Mira the Wonderful.** Mira, aka Omicron Ceti, is a binary star system that consists of a red giant (Mira A) undergoing mass loss and a high temperature white dwarf companion (Mira B) that is accreting mass from Mira A. Mira A also undergoes slow, regular pulsations and leaves a comet-like tail as it moves through the interstellar medium.  
<http://earthsky.org/brightest-stars/mira-quite-wonderful>
- **As Cassini makes 1st 'Grand Finale' dive, more Saturn mysteries remain.** NASA's Cassini spacecraft has begun the final — and most daring — phase of its epic mission to Saturn.  
[http://www.space.com/36604-cassini-spacecraft-first-grand-finale-dive-saturn.html?utm\\_source=notification](http://www.space.com/36604-cassini-spacecraft-first-grand-finale-dive-saturn.html?utm_source=notification)

### Observing.

- **All about the Andromeda galaxy.**  
<http://earthsky.org/clusters-nebulae-galaxies/andromeda-galaxy-closest-spiral-to-milky-way>
- **Achernar is the End of the River.** Achernar, aka Alpha Eridani, is the 9th brightest star in Earth's sky and the flattest star known. It is so flattened due to its exceptionally rapid rotation.  
<http://earthsky.org/brightest-stars/bright-achernar-ends-the-southern-river>

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

- **Glorious new images show Titan's dunes.**  
<http://earthsky.org/space/july-25-flyby-images-titan-cassini-saturn>
- **Historic liftoffs from Pad 39A - from Apollo to SpaceX.** See a video clip.  
[http://www.space.com/35751-historic-liftoffs-from-pad-39a-from-apollo-to-spacex-video.html?utm\\_source=sp-newsletter&utm\\_medium=email&utm\\_campaign=20170217-sdc](http://www.space.com/35751-historic-liftoffs-from-pad-39a-from-apollo-to-spacex-video.html?utm_source=sp-newsletter&utm_medium=email&utm_campaign=20170217-sdc)
- **Huge gas cloud headed for Milky Way.** See an animation.  
<http://earthsky.org/space/massive-cloud-on-collision-course-with-milky-way>
- **Jupiter is a feast for the eyes In new time-lapse animation.**  
[http://www.space.com/35827-journey-to-jupiter-animation-video.html?utm\\_source=sp-newsletter&utm\\_medium=email&utm\\_campaign=20170224-sdc](http://www.space.com/35827-journey-to-jupiter-animation-video.html?utm_source=sp-newsletter&utm_medium=email&utm_campaign=20170224-sdc)
- **Image of Jupiter's upper cloud tops by NASA's Juno spacecraft.** [http://earthsky.org/todays-image/jupiter-atmosphere-photo-juno?utm\\_source=EarthSky+News&utm\\_campaign=659ecf5cdf-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-659ecf5cdf-394671529&mc\\_cid=659ecf5cdf&mc\\_eid=febfe10e42](http://earthsky.org/todays-image/jupiter-atmosphere-photo-juno?utm_source=EarthSky+News&utm_campaign=659ecf5cdf-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-659ecf5cdf-394671529&mc_cid=659ecf5cdf&mc_eid=febfe10e42)
- **The greatest photo of the 20th century.** It's of Earth visible above the moon's horizon. See a video clip of the story behind it. <https://www.youtube.com/embed/dE-vOscpiNc>
- **35 astronomy images with captions.**  
[http://www.space.com/34-image-day.html?utm\\_source=notification?utm\\_source=notification](http://www.space.com/34-image-day.html?utm_source=notification?utm_source=notification)
- **Record-setting star orbits dangerously close to black hole.** See an animation.  
<http://www.space.com/36053-black-hole-closest-orbiting-star.html>
- **Milky Way over New Zealand.** The galactic core of the Milky Way over Lake Tekapo in New Zealand, an International Dark Sky Reserve. See an image. [http://earthsky.org/todays-image/photo-milky-way-over-new-zealand?utm\\_source=EarthSky+News&utm\\_campaign=cf9d3ed210-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-cf9d3ed210-394671529&mc\\_cid=cf9d3ed210&mc\\_eid=febfe10e42](http://earthsky.org/todays-image/photo-milky-way-over-new-zealand?utm_source=EarthSky+News&utm_campaign=cf9d3ed210-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-cf9d3ed210-394671529&mc_cid=cf9d3ed210&mc_eid=febfe10e42)
- **Video: Close-approach comets.** Video about comets passing near Earth in 2017 and 2018, and about how scientists are studying them. Plus photos! [http://earthsky.org/space/sciencecast-video-close-approach-comets-2017-2018?utm\\_source=EarthSky+News&utm\\_campaign=d38fdec053-EarthSky+News&utm\\_medium=email&utm\\_term=0\\_c643945d79-d38fdec053-394671529&mc\\_cid=d38fdec053&mc\\_eid=febfe10e42](http://earthsky.org/space/sciencecast-video-close-approach-comets-2017-2018?utm_source=EarthSky+News&utm_campaign=d38fdec053-EarthSky+News&utm_medium=email&utm_term=0_c643945d79-d38fdec053-394671529&mc_cid=d38fdec053&mc_eid=febfe10e42)



## Feature of the month: Seeking and visiting Alpha Centauri's unseen planets

Things are getting very exciting, both in the search for planets beyond Earth and in our ability to visit these worlds someday.

- A new agreement between the **European Southern Observatory** and **Breakthrough Initiatives** (Russian physicist and billionaire Yuri Milner's organization) will let ESO's Very Large Telescope seek planets in the Alpha Centauri star system next door. It'll allow an instrument upgrade – and purchase telescope time – to gain more information about planets in the Alpha Centauri system, the star system next door. Knowing where the nearest exoplanets are, is of paramount interest for **Breakthrough Starshot**, the research and engineering programme launched in April 2016 by **Breakthrough Initiatives**. It aims to demonstrate proof of concept for ultra-fast “nanocraft”, laying the foundation for the first launch to Alpha Centauri within a generation. They will be driven from Earth by a still-to-be-built enormous laser system. In fact, **Breakthrough Starshot** plans not only to launch within a generation, but to get there on a timescale we humans can fathom. But the swarm of “nanocraft” don't leave a lot of time for exploration. There's no way to slow them down when they reach Alpha Centauri. They will zip through the star system in minutes.

<http://earthsky.org/space/eso-breakthrough-initiatives-vlt-alpha-centauri>

<http://earthsky.org/space/breakthrough-starshot-aims-for-alpha-centauri>

[https://en.wikipedia.org/wiki/Very\\_Large\\_Telescope](https://en.wikipedia.org/wiki/Very_Large_Telescope)

[http://earthsky.org/brightest-stars/alpha-centauri-is-the-nearest-bright-star?mc\\_cid=3eee27dcf8&mc\\_eid=febfe10e42](http://earthsky.org/brightest-stars/alpha-centauri-is-the-nearest-bright-star?mc_cid=3eee27dcf8&mc_eid=febfe10e42)

- A team of astrophysicists has come up with another concept. A huge sail will be deployed by a small spacecraft. The sail will use the Sun's light to propel the spacecraft from behind, and later use the light from Alpha Centauri to brake it. The craft will then be slowed down enough to go into orbit around Alpha Centauri and study it for a much longer time than the “nanocraft” mentioned above. But this craft will take a much longer time to reach Alpha Centauri than the “nanocraft” of **Breakthrough Starshot**.

[http://news.nationalgeographic.com/2017/02/closest-earth-planet-proxima-b-centauri-solar-sail-space-science/?utm\\_source=NatGeocom&utm\\_medium=Email&utm\\_content=wild science 20170211&utm\\_campaign=Content&utm\\_rd=1654931348](http://news.nationalgeographic.com/2017/02/closest-earth-planet-proxima-b-centauri-solar-sail-space-science/?utm_source=NatGeocom&utm_medium=Email&utm_content=wild%20science%2020170211&utm_campaign=Content&utm_rd=1654931348)

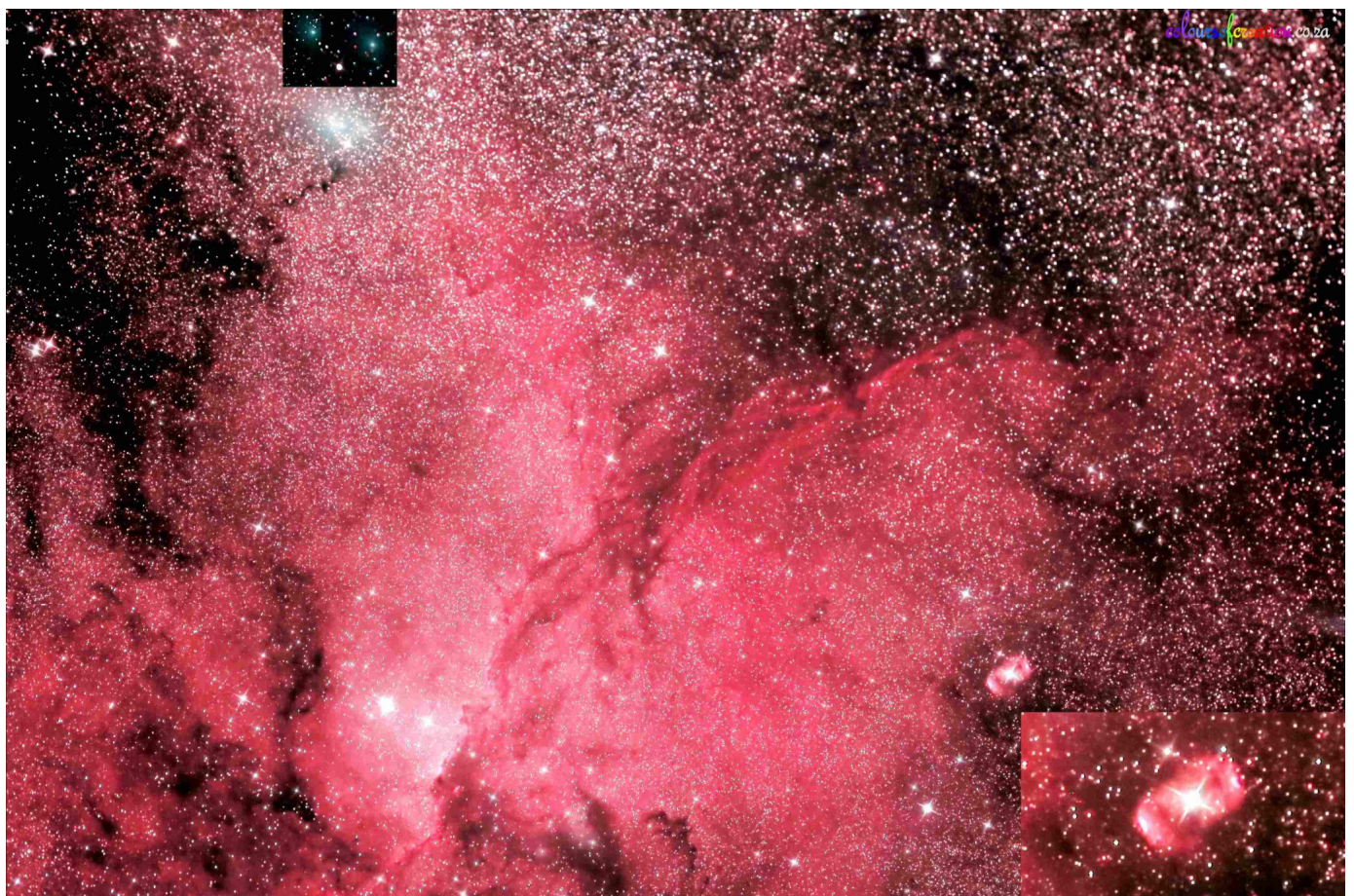
### Astronomy basics: How do astronomers find exoplanets?

Stars are incredibly bright in contrast to any planets that may be orbiting them. So finding exoplanets – planets orbiting distant suns – isn't easy. Here's how it's done.

[http://earthsky.org/space/how-do-astronomers-discover-exoplanets?utm\\_source=EarthSky+News&utm\\_campaign=4a1703f690-EarthSky News&utm\\_medium=email&utm\\_term=0\\_c643945d79-4a1703f690-394671529&mc\\_cid=4a1703f690&mc\\_eid=febfe10e42](http://earthsky.org/space/how-do-astronomers-discover-exoplanets?utm_source=EarthSky+News&utm_campaign=4a1703f690-EarthSky%20News&utm_medium=email&utm_term=0_c643945d79-4a1703f690-394671529&mc_cid=4a1703f690&mc_eid=febfe10e42)

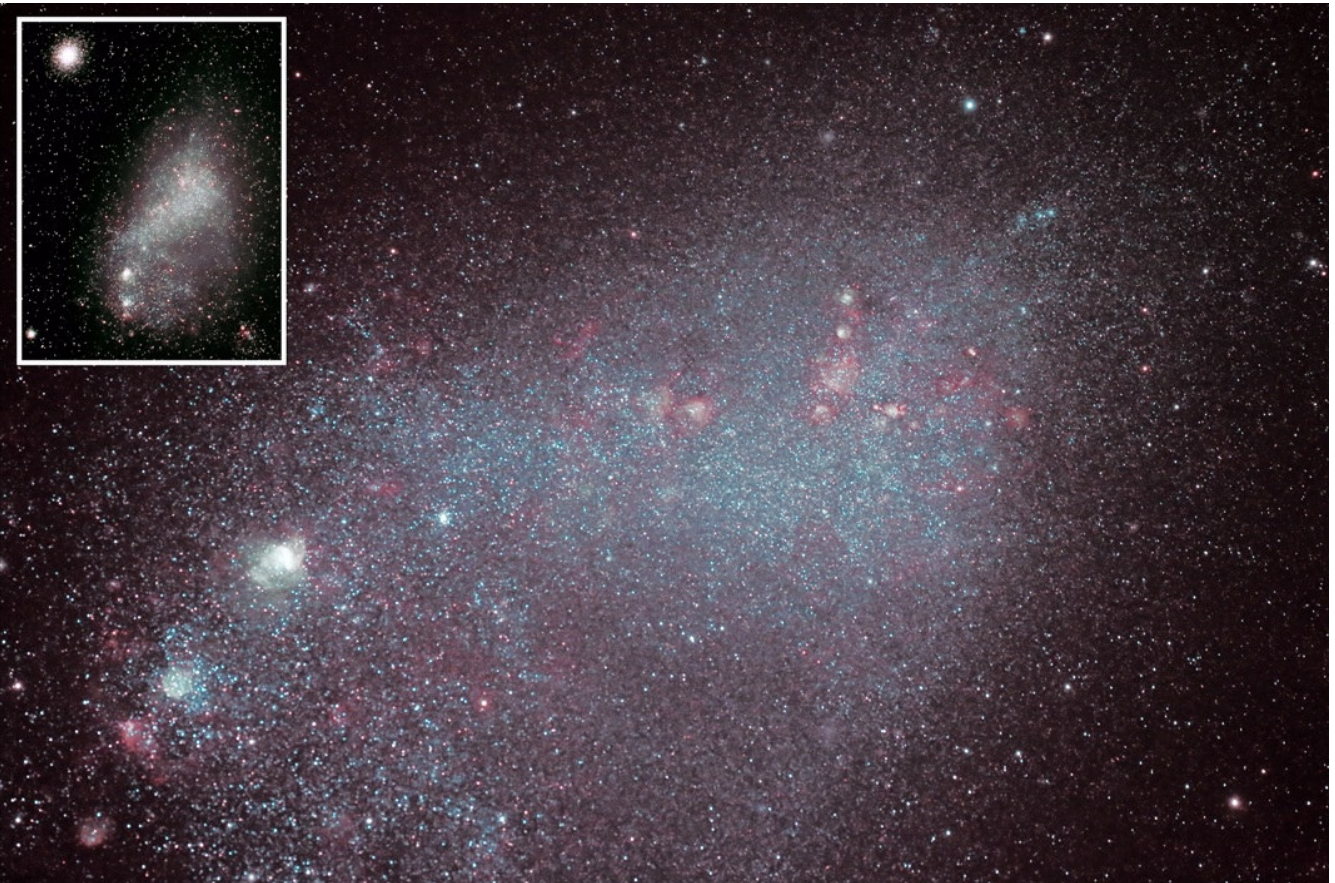
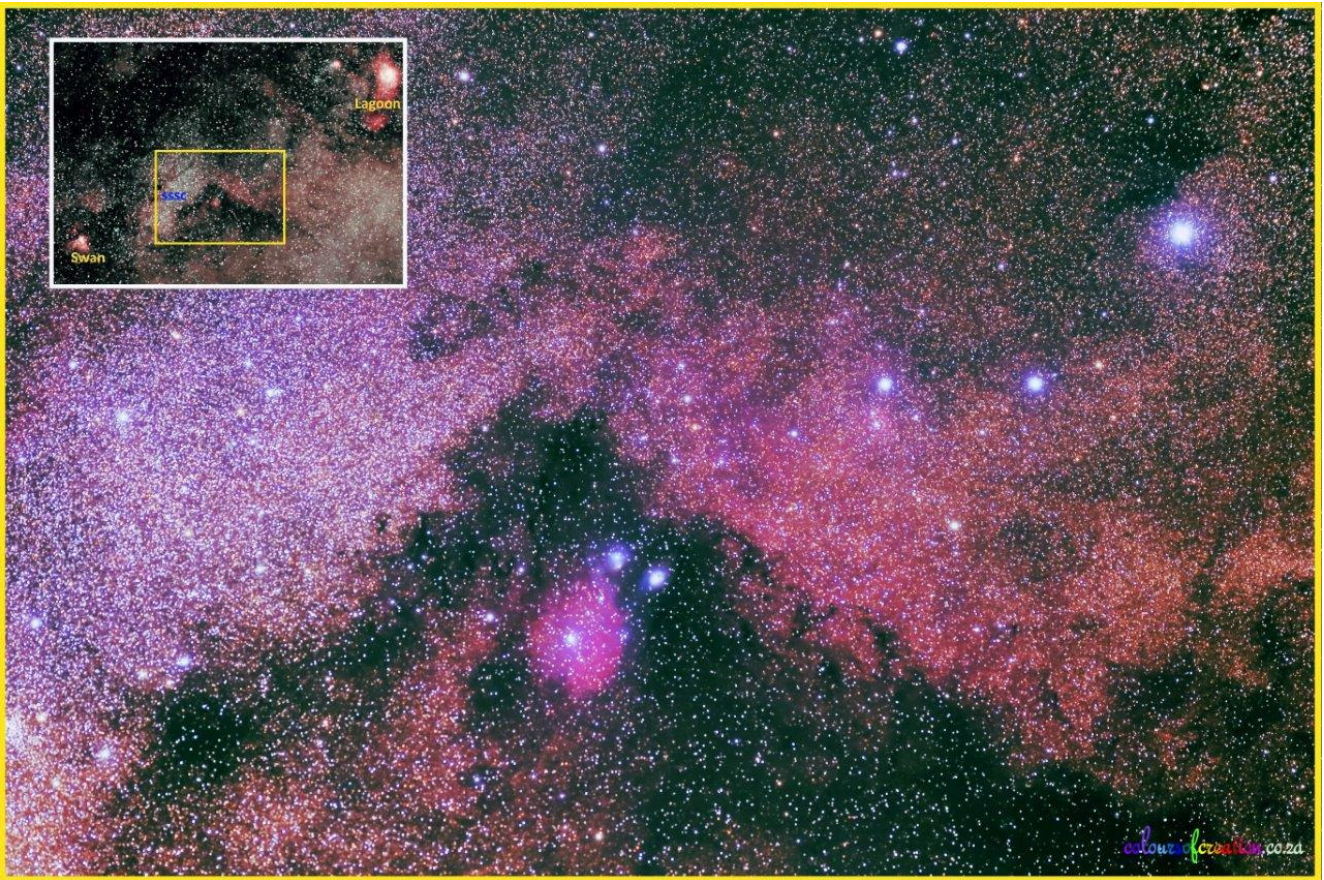
**Immediately below:** The region around the Coal Sack.

**Below:** NGC 6164/6165, a bipolar emission nebula in the Southern constellation Norma (The Carpenter's Square). It surrounds triple star system HD 148937. Photographs: Johan Moolman.



**Below:** About halfway between the Lagoon Nebula and the Swan lies the emission nebula IC 1284/3 in constellation Sagittarius (The Archer). The two blue reflection nebulae are NGC 6589 and 6590, lit by bright stars that are part of the loose open cluster NGC 6595.

**Bottom:** The Small Magellanic Cloud.  
All photographs by Johan Moolman.



M16 aka the Eagle Nebula and NGC 6611 is a diffuse emission nebula or H II region in the southern constellation Serpens (The Serpent). The nebula contains several active star-forming gas and dust regions, including the "Pillars of Creation". Photograph by Dawie Venter.



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★ Pretoria Centre committee ★

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★ Secretary	Michael Poll	074 473 4785
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★ Observing Coordinator	Percy Jacobs	060 883 8106
★ Treasurer and		
★ Membership Secretary	Michelle Ferreira	073 173 0168
★ Member	Bosman Olivier	082 883 1869

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**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.