The PRETORIA CENTRE
of the
Astronomical Society of Southern Africa
www.pretoria-astronomy.co.za

NEWSLETTER APRIL 2024

NEXT MEETING

Venue: Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.
Date and time: Wednesday 24 April at 19h15.
Programme:

- **"What's up in May?"** by Michael Poll.
- Main talk: **"Impacts since 1900"** by Michael Poll. See a summary on page 6.
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Michael Poll.

NEXT OBSERVING EVENING

Friday 19 April from sunset onwards at the Pretoria Centre Observatory, which is also situated at CBC. Turn left immediately after entering the main gate. Carry straight on through the car park and proceed down the tarred road that drifts to the left out of the car park and then swerves to the right. About 50 to 100 metres after the last row of studs there is a cricket sight-screen on the right. Observing will be on the cricket pitch just past the sight-screen.

Please note that we have been instructed that no one is to drive on to the sports fields because of possible damage to the irrigation systems there.

TABLE OF CONTENTS

Astronomy related articles on the Internet

1. What the JWST has taught us so far. 2 years since James Webb Telescope opened up, this is what it's taught us about the universe (msn.com)

2. The OSIRIS-APEX mission is heading for asteroid Apophis (450 × 170 metres in size) which will pass by Earth at a distance of **only 32 000 km** (which is 5 X Earth's radius) on April 13, 2029. OSIRIS-APEX mission is headed to asteroid Apophis (earthsky.org)

3. Nova outburst soon? A 'new star' from a nova outburst is expected soon (earthsky.org)

4. Forget UFOs and alien abductions, here's how scientists are really looking for life on other worlds. Where we might find aliens in the next decade (bbc.com)

5. Betelgeuse. Betelgeuse is dimming again. When will it explode? (earthsky.org)

6. What is a galaxy?
What is a galaxy? All you need to know about galaxies (earthsky.org)

7. Black hole swallowing a star.
Scientists find closest proof yet of black hole spaghettifying a star | Space

8. Long trail of stars follows galaxy interactions.
NASA's Hubble Traces 'String of Pearls' Star Clusters in Galaxy Collisions | HubbleSite

9. HST sees black hole devouring a star.
Hubble Finds Hungry Black Hole Twisting Captured Star Into Donut Shape | HubbleSite

10. Beta Centauri is a triple star system.
Beta Centauri is one of the Southern Pointer Stars (earthsky.org)

11. The threat of supernovas. The threat of supernovas to life on Earth (earthsky.org)

12. The Universe is humming with gravitational waves and scientists are excited at the prospect of hearing more of this cosmic symphony. LISA will be more sensitive than LIGO.
1st gravitational wave detector in space 'LISA' will hunt for ripples in spacetime | Space

NOTICE BOARD

SOHO. SOHO (**So**lar and **H**eliospheric **O**bservatory) is an observatory orbiting the Sun, and designed to make observations of the Sun. But 5000 sun-grazing comets have now been discovered on its images. It was not designed for finding such comets. Most discoveries were made by amateurs. You can help discover more.
5000th comet for sun-observing SOHO spacecraft (earthsky.org)

UAPs. A newly published government report states that not only is there no proof of any secret effort by the US government to cooperate with aliens or research alien technology, there is no proof that UAP sightings are the result of extraterrestrial visitations to Earth. The Pentagon Has Broken Its Silence on UFOs and Secret Alien Relations (popularmechanics.com)

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.

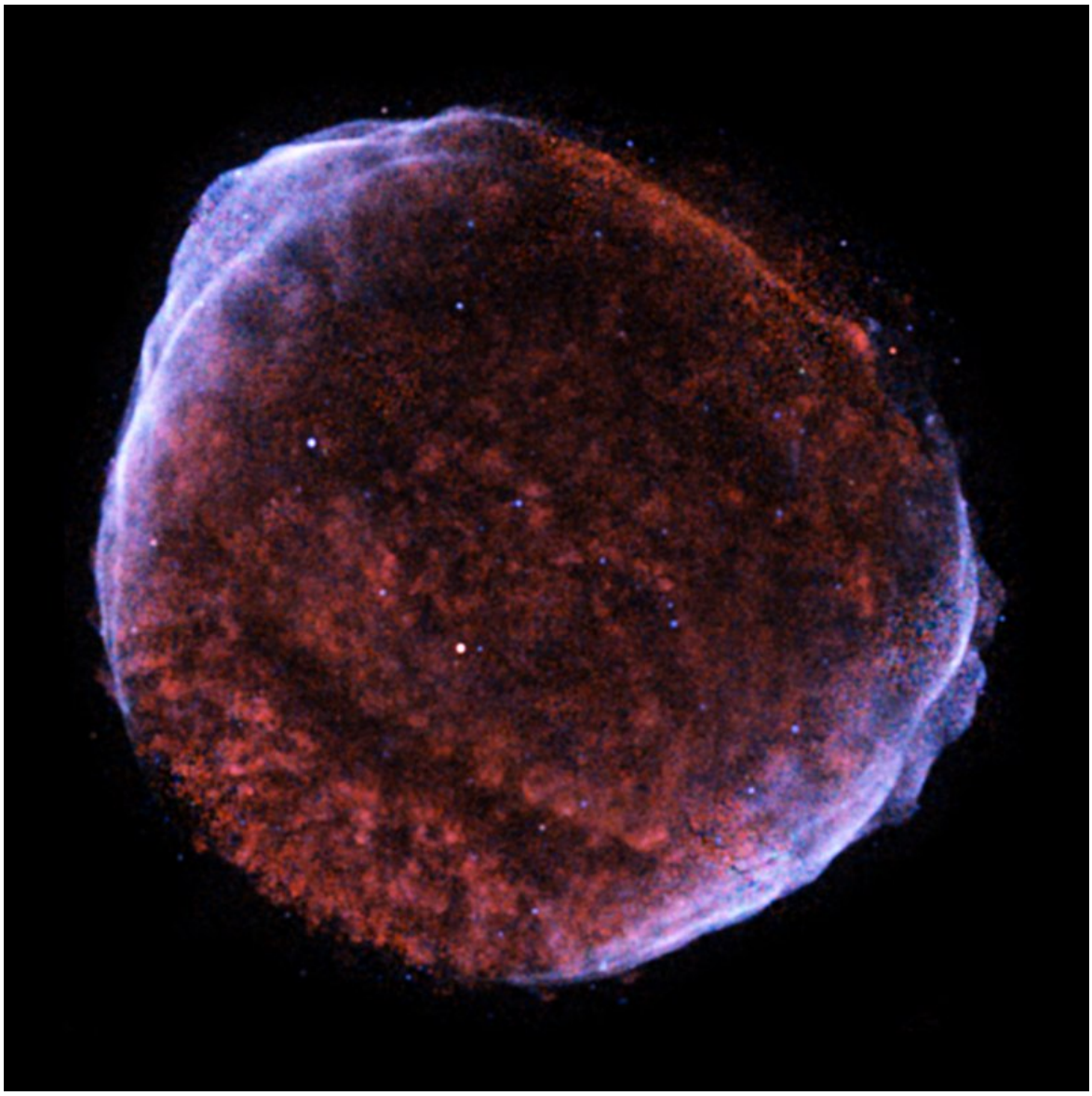
Feature of the month: SN 1006 – by Pierre Lourens

Well known to professional and amateur astronomers alike, is **SN 1054.** It was a supernova that was first observed on c. 10 July 1054 CE in constellation Taurus (The Bull), and remained visible until c. 12 April 1056 CE. It is now known that it was a supernova of type II. What remains of it today is the expanding Crab nebula and the Crab pulsar at its centre.

Less well known is **SN 1006**. It was a supernova that appeared between April 30 and May 1, 1006 CE in constellation Lupus (The Wolf). This "guest star" was described by observers across China, Japan, modern-day Iraq, Egypt, and Europe.

SN 1006's associated remnant from this event was not identified until the year 1965. No associated neutron star or black hole inside it has been found. This is the situation expected for a type Ia supernova. Such a supernova results when a white dwarf star explodes, destroying the star completely. But it should then have a surviving companion, from which matter would have been transferred to it until it reached a critical mass and exploded. A survey in 2012 that intended to find such a surviving companion of the SN 1006 progenitor, found none. SN 1006 - Wikipedia

The image shows a false colour X-ray image of the SN 1006 supernova remnant.



Proposal for a new calendar – by Pierre Lourens

On leap year day this year, i.e. 29 February, I started thinking about our calendar. Some months have 30 days, others 31, February has 28 (and in a leap year 29). The beginning and the end of a month can be on any day of the week. The calendar for different months look different. And the calendar for different years start on different days of the week.

The week of 7 days [$] and the names of the days of the week are so ingrained in our minds that I think it should be kept in a new calendar. I propose a calendar with the year divided into 13 months of 28 days each. Each month is divided into 4 weeks of 7 days each. This gives 13 x 4 x 7 = 364 days. At the beginning of each year, a **New Year's Day** is added to make the total number of days 365.

The length of a tropical year [*] is 365.2422 mean solar days. In order to keep the calendar from falling behind the seasons, days should be added to the calendar in appropriate years – called leap years – as is done for our present (Gregorian) calendar.

Every year that is exactly divisible by four is a leap year, except for centurial years that are exactly divisible by 100. However, these centurial years **are** leap years if they are also exactly divisible by 400. For example, the years 1700, 1800, and 1900 are not leap years, but the years 2000 and 2400 are.

The extra day is tacked on at the end of each leap year, and is simply called **Leap Year Day**.

The names of the months are done away with. The months are numbered 1, 2, ... , 13, the weeks 1, 2, 3, 4 and the days 1, 2, ... , 28. Let's see what the calendar in a year that is not a leap year, e.g. 2025, looks like. The calendar for the 1st month looks as follows:

Year 2025 Month 1

New Year's Day	-	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
	Week 1	1	2	3	4	5	6	7
	Week 2	8	9	10	11	12	13	14
	Week 3	15	16	17	18	19	20	21
	Week 4	22	23	24	25	26	27	28

The calendar for the 2nd month in the year, then looks as follows:

Year 2025 Month 2

-	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Week 1	1	2	3	4	5	6	7
Week 2	8	9	10	11	12	13	14
Week 3	15	16	17	18	19	20	21
Week 4	22	23	24	25	26	27	28

The calendar for the other 11 months look the same as for month 2, except that the number of the month changes.

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In a leap year, e.g. 2028, the calendar for the 1st 12 months look exactly as described above (with 2025 replaced by 2028) , but for the 13th month, it looks like this:

Year 2028 Month 13

-	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	**Leap Year Day**
Week 1	1	2	3	4	5	6	7	-
Week 2	8	9	10	11	12	13	14	-
Week 3	15	16	17	18	19	20	21	-
Week 4	22	23	24	25	26	27	28	-

New Year's Day should be a public holiday, as it is at present. Leap Year Day should also be a public holiday. The date of New Year's Day is given as **New Year's Day 2028**, and that of Leap Year Day as **Leap Year Day 2028**.

The date of a day, e.g. the 4th day of the 2nd month in the calendar for year 2025 is given as **2025/2/4**. A specific week in this calendar, e.g. the 3rd week of the 2nd month, is specified as **2025/2/week 3**.

The advantage of this calendar is that it looks the same for every month of every year, except for the 1st month of every year (when New Year's Day is tacked on at the beginning of the month), and for the 13th month of a leap year (when Leap Year Day is tacked on at the end of the month).

I think people will soon adjust to this new calendar. Why do I think so? In 1961, South Africa switched over from the cumbersome British money system of pounds, shillings and pennies to the simpler decimal system of rands and cents. People here soon adjusted to the decimal system. In 1970, South Africa metricated, i.e., it switched over from the cumbersome British units # to metric units. People here soon adjusted to the metric system.

To make the change to the new calendar easier, a computer program that converts a date in the present calendar to one in the new calendar and vice versa can easily be written and installed on people's PC's and / or smartphones. Also, for the first few years, the date on the present calendar should be added in small print next to the date of each day on the new calendar.

***** A **tropical year** aka **solar year** is the time that the Sun takes to return to the same position in the sky (as viewed from a celestial body of the Solar System, in this case the Earth) thus completing a full cycle of seasons – for example, the time from vernal equinox to vernal equinox, or from summer solstice to summer solstice.

$ The origin of the week of 7 days lies far back in time. Ancient Mesopotamian astrologers devised a 7 day week inspired by the 7 heavenly bodies that wandered about the sky between the stars, namely the Sun, the Moon, Mercury, Venus, Mars, Jupiter and Saturn. (Uranus, Neptune and the dwarf planets are not visible with the naked eye.) These 7 heavenly objects were viewed as gods. And because there were 7, they regarded 7 as a holy number. The names of the days of the week were given the names of these gods.

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Later civilizations took over the week and gave the days of the week the names of their own gods.

I couldn't resist the temptation to poke fun at the cumbersome British units**:** the British measure speed in **furlongs per fortnight**, fuel consumption in **UK gallons per furlong** and heat flow in **British thermal units per acre per leap year** ! **Ω**

Report for the observing evening on March 22nd 2024 – by Michael Poll

Danie, Hannes and Michael attended but the conditions were not good for observing. High wispy clouds with another layer lower down drifting around blotted out various patches of sky, and a waxing gibbous Moon which was 36 hours from full was swanning around in the east. We did look at the Moon with Danie's 90 mm Questar, but we could only pick out Copernicus and Aristarchus and little else. We saw just a couple of bright stars including Sirius and Betelgeuse, but not many others.

Otherwise we discussed comparisons between printed star charts and cell phone Apps. Apps can be a bit confusing if there is too much on the small screen, and the features in a wider field of view become too small to be seen clearly. For a beginner, a clear printed chart is preferable – as with the one on **Skymaps.com**. **Ω**

Summary of main topics to be presented on April 24th & May 22nd 2024 – by Michael Poll

The title will be: **"Impacts since 1900"**. Many impacts were recorded and documented in the last century and into this one. The possibility of a meteorite impact which could have a widespread devastating effect on the Earth is now taken very seriously. Since 1998, the United States, the European Union, and other nations have been scanning the sky to detect as many potential impactors as possible. These bodies are referred to as Near Earth Asteroids (NEAs).

Over 34 000 NEAs have been detected. A scale called the Torino Scale rates the risk presented by an identified NEO impacting the Earth and on how severe the consequences of various impacts would be. This presentation discusses the frequency of impacts, details the breakdown of the figures for the number of NEAs detected and describes the Torino scale.

A number of documented impacts of interest will be described at the April and May meetings. The particular events are: Tunguska in 1908 (Russia); Sikhote-Alin in 1947 (Russia); Sylacuaga, Alabama, USA in 1954; the Grand Teton Meteor in 1972 (USA); Peekskill, New York, USA in 1992; Chelyabinsk (Russia) in 2013; and Motopi Pan (Botswana) in 2018. **Ω**

Summary of "What's Up" to be presented on April 24th 2021 - by Michael Poll

Evening Sky

April 23rd - 24th Full Moon (at 01h49 on April 24th)
April 26th Moon near Antares
May 10th Occultation of Beta Tauri. The Moon is about 36 hours old. Occultation starts before sunset. Reappearance 18h24 for Johannesburg.
May 12th Moon near Pollux
May 15th Moon near Regulus
May 18th Jupiter in conjunction with the Sun
May 20th Moon near Spica
May 22nd Moon occults globular cluster NGC 5897 in Libra. Start 19h00 End 21h00
May 23rd Full moon 14:53

All Night

May 23rd -24th Moon near Antares
May 24th Occultation of Sigma (σ) Scorpii. Disappearance: 01h45 Reappearance 03h06. Sigma (σ) Scorpii is double. Components of magnitude 2.9 and 7.8. Separation: 20".

Morning Sky

May 4th Moon near Saturn
May 5th Moon near Mars
May 6th Moon near Mercury
May 7th Moon near Venus
May 9th Mercury greatest elongation west: 26°
May 23rd Venus near Jupiter: the separation is less than 0.5°, but the event not visible as they are only about 3½° east of the Sun.
May 31st Moon near Saturn
June 4th Venus in superior conjunction with the Sun **Ω**

Astronomy related images, video clips and documentaries on the Internet

Seagull nebula. Astrophoto of the month — Seagull Nebula takes flight | Space

Image of Sagittarius A*.
BREAKING! Milky Way's black hole in new image (earthsky.org)

Total solar eclipse 8 April 2024: images, video.
These solar eclipse 2024 photos from our readers are absolutely amazing (images, video) | Space

Astronomy basics: The Big Bang theory

Read an exposition of the Big Bang theory and the four lines of evidence for it.

The "crisis in cosmology" is pure exaggeration - Big Think

Report for the meeting on 27 March 2024 – by Michelle Ferreira

"What's up in April" was presented by myself. Four of the planets, namely Venus, Saturn, Mars and Mercury are visible during the month of April. However, a lot of the visibility happens in the early morning, before sunrise.

Some of the brightest stars that featured close to the Moon were in Pollux on 15 April near First Quarter Moon (21:13), on 18 April – the Moon near Regulus, on 23 April – the Moon near Spica and on 26 April – the Moon near Antares.

For the second part of the meeting, we had a singular experience to watch two very interesting video clips. The first one Johan Smit sourced for us was about supernovae. It detailed the most extreme explosions and I believe it was quite informative. The second clip was an artist's/scientist's rendering of what we see at the speed of light. I found both quite entertaining and interesting. The evening ended with some lively discussion with our virtual counterparts as well as coffee and a chat later with those attending the meeting in person. **Ω**

M60-UCD1 - by Pierre Lourens

M60-UCD1 is an ultra compact dwarf galaxy. It contains over one hundred stars per cubic light-year*. It is 49 million light-years from Earth, close to Messier 60 (aka M60 and NGC 4649) in the Virgo cluster of galaxies. There is a super massive black hole with a mass of 20 million $M_\odot$ at its centre. Below is an artist's depiction of the black hole. What is depicted there is a pitch black sphere – looking dark as a dungeon - the surface of which is named the event horizon, from which nothing can escape, not even light. Its radius is called the Schwarzschild radius, given by the simple formula

$$\mathbf{r_S = 2GM / c^2}$$

where **G** is the gravitational constant, **M** is the object mass, and **c** is the speed of light in vacuum. The value of this radius can easily be calculated on a pocket calculator.

We have: $\mathbf{G = 6.6743 \times 10^{-11}\ m^3 \cdot kg^{-1} \cdot s^{-2}}$

$\mathbf{M = 20 \times 10^6\ M_\odot}$

with $\mathbf{M_\odot = 1.9885 \times 10^{30}\ kg}$

$\mathbf{c = 2.9979 \times 10^8\ m \cdot s^{-1}}$

On a pocket calculator, this yields (**check it**):

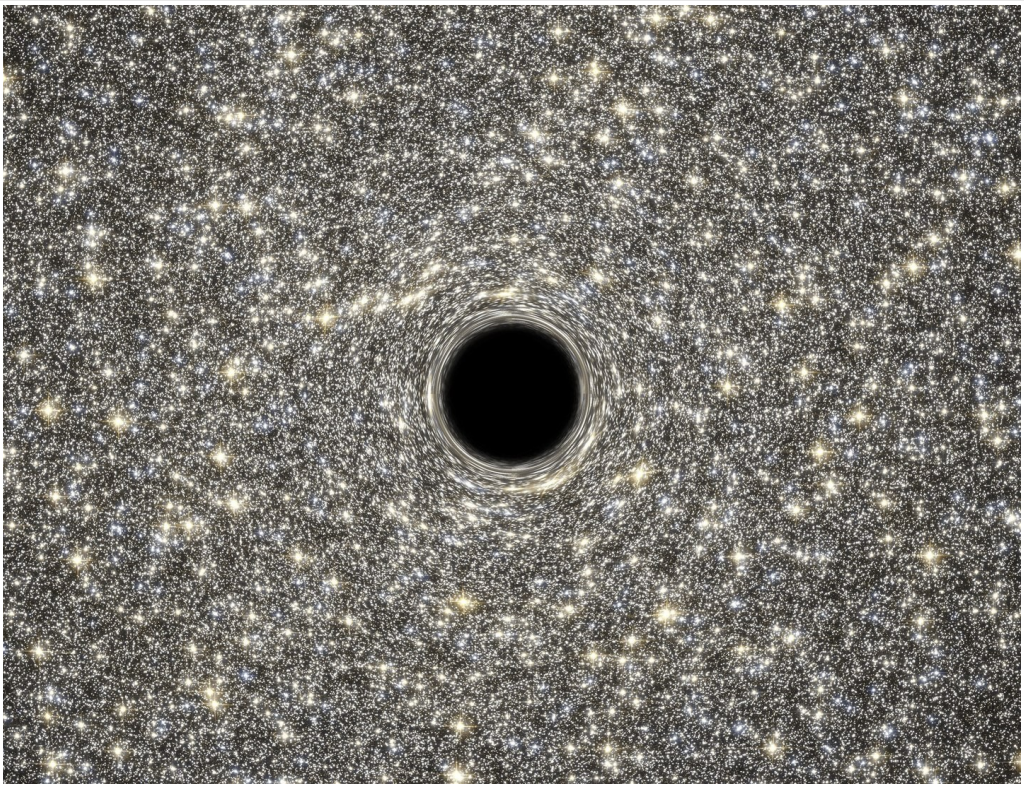
$\mathbf{r_S = 5.9366 \times 10^{10}\ meters}$

Since $\mathbf{1\ AU = 1.4960 \times 10^{11}\ meters,}$

$\mathbf{r_S = 0.397\ AU}$

I.e. the Schwarzschild radius is 0.397 x average distance from the Sun to the Earth. **Ω**

* 100 stars/cubic light-year = 1 star/0.01 cubic light-years in M60-UCD1 means that the average distance between stars is 0.22 light-years in M60-UCD1. For comparison, the average stellar density is 1 star/658 cubic light-years here in the galactic disk, which means that the average distance between stars is 8.7 light-years in the galactic disk, about 40 times more than in M60-UCD1.



Observing: NGC 663, The parents and children – by Magda Streicher

An open cluster that never fails to impress me is NGC 663, situated in the constellation Cassiopeia, just 2.5 degrees north-east of the creamy coloured Delta Cassiopeiae. It is an ordinary open cluster, one of probably millions in our Milky Way. So, what is it that made this one different? Not much, but in a way it speaks to the mind through the curious positioning of its members.

First, it is a bright cluster, relatively large, with at least 70 members in its mists, and a few brighter ones sprinkled around. With careful observation, and perhaps with the use of a filter, a nice curved dark lane can be seen running through the cluster from north to south. My attention is caught and held by the four brightest blue-white members standing out quite well on the surface. The impression is that of eyes of parents as they take shelter with their children in the dark of night. See for yourself! **Ω**

(Magda Streicher's e-mail address: magdalena@mweb.co.za)

OBJECT	TYPE	RA	DEC	MAG	SIZE
NGC 663	Open cluster	01 h 46.2 m	+ 61° 14.6'	7	16'

NGC 663

Immediately below: An imaginary alien spacecraft, the size of a city.

Below: This shows a scene on an exoplanet with a life form on it. Swarms of the life form drift with the streams in its atmosphere. Everything in this scene is imaginary. (But recall what J B S Haldane (1892 – 1964) said: "*I have no doubt that in reality the future will be vastly more surprising than anything I can imagine. Now my own suspicion is that the Universe is not only queerer than we suppose, but queerer than we* ***can*** *suppose*.")

Web links for the astronomy enthusiast

- **The website for all information about the ASSA and the ASSA Centres:**
  https://assa.saao.ac.za/
- **ASSA Specialist Sections:**
  ASSA has various areas of interest. Join and participate!
  https://assa.saao.ac.za/sections/
- **ASSA Publications to download and enjoy:**
  MNASSA: https://www.mnassa.org.za/
  Nightfall: http://assa.saao.ac.za/sections/deep-sky/nightfall/
  To receive as part of ASSA membership benefits - *Sky Guide Southern Africa,* the astronomical handbook for Southern Africa:
  http://assa.saao.ac.za/about/publications/sky-guide/
- **Mail Groups to join:**
  For general ASSA related information: https://groups.io/g/ASSA-announce
  For posting general items and discussion: https://groups.io/g/ASSA-discussion
- **Social Media to join and share:**
  Facebook: https://www.facebook.com/Astrosocsa/?_rdc=1&_rdr
  Youtube: https://www.youtube.com/channel/UCJ4b1fhmPvYTOsy15YP-_JA
  Twitter: https://twitter.com/AstroSocSA
- **Planetaria:**
  WITS Planetarium (Johannesburg): Welcome to Wits Planetarium
  Naval Hill Planetarium (Bloemfontein): Planetarium Home (ufs.ac.za)
  Iziko Planetarium (Cape Town): Planetarium and Digital Dome - Iziko Museums
  Sutherland Planetarium (Sutherland): Sutherland Planetarium
- **More web links can be found on page 118 of "2023 SKY GUIDE Southern Africa". Ω**

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