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

NEWSLETTER JULY 2023

NEXT MEETING

Venue: Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.
Date and time: Wednesday 26 July at 19h15.
Programme:

- "What's up in August 2023?" by Johan Jordaan.
- Annual general meeting.
- Main talk: "Dark sky feedback" by Johan Moolman and Johan Smit.
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Johan Smit.

NEXT OBSERVING EVENING

Friday 21 July 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

Scientists: To Hunt Down Aliens, Follow Their 'Technosignatures' (popularmechanics.com)

Moon analemma over Egypt's Great Pyramids (earthsky.org)

A cyclone has been spotted swirling over Uranus' north pole for the first time (sciencenews.org)

Gravitational wave detector LIGO is back online after 3 years of upgrades – how the world's most sensitive yardstick reveals secrets of the universe (theconversation.com)

Two small asteroids recently passed close by Earth - too close for comfort. Let's hope this spurs on the development of asteroid deflection technology.
House-sized asteroid followed by bus-sized asteroid (earthsky.org)

EarthSky The ecliptic is the sun's path in our sky

A supermassive black hole orbiting a bigger one revealed itself with a flash (sciencenews.org)

The multiverse is cosmology's unreachable frontier - Big Think

Despite computers at our fingertips, the Internet and orbiting observatories gathering masses of data about the Universe, there is still much about it that is not understood.
95% of the Universe is a total mystery - Big Think

The extreme nature of exoplanet WASP-12B makes it frightening.
Exoplanet-catalog – Exoplanet Exploration: Planets Beyond our Solar System WASP-12 b (nasa.gov)

Bound together by gravity, these 5 stars appear as 1 to our unaided eyes from 162 light-years away. Visible near Vega aka Alpha Lyrae in the night sky in July and August.
Epsilon Lyrae is the famous Double Double star (earthsky.org)

This cluster is in the south of the constellation Vulpecula, near the constellation Sagitta. Visible in the night sky in July and August.
Coathanger cluster: It does look like its name (earthsky.org)

This explosion has lasted for more than 3 years.
Largest cosmic explosion ever seen is still ongoing (earthsky.org)

Amazing Solar System Facts - Stunning Destinations in the Solar System (popularmechanics.com)

NASA's Webb Space Telescope has observed the largest water plume on Enceladus ever seen.
News from Enceladus via Webb: A huge water plume! (earthsky.org)

This is the beautiful globular cluster Messier 3 in the constellation Canes Venatici (The Hunting Dogs). The cluster contains about a half million stars. 170 of those are known to be RR Lyrae variable stars. The Hubble Space Telescope captured this image. **Ω**

Supernova SN 2023ixf in the Pinwheel Galaxy, also known as Messier 101. The type II supernova is in one of the spiral arms and is indicated by the arrow. SN 2023ixf has been making headlines since it first burst into view on May 19 2023, when supernova hunter Koichi Itagaki from Yamagata, Japan, spotted a new bright spot in the galaxy. The supernova was confirmed the following day by the Zwicky Transient Facility (ZTF) in California. **Ω**

Summary of "What's up in August 2023?" to be presented by Johan Jordaan on 26 July 2023

Moon Phases

1 Aug 2023: Full Moon (20:31; 357 530 km)
8 Aug 2023: Third Quarter
16 Aug 2023: New Moon
24 Aug 2023: First Quarter
31 Aug 2023: Full Moon (03:35) – Perigee

Celestial Almanac

The full celestial almanac can be referenced in the Sky Guide 2023.
8 Aug: Moon near Jupiter
13 Aug: Venus nearest Earth
25 Aug: Moon near Antares
26 Aug: Moon southernmost (13:53)
30 Aug: Moon near Saturn. Moon at perigee (17:52; 357 181 km).
There are two Super Moons in August: On 1 August there is the Pease Moon and the Dusty Moon is on 31 August, which will be the largest Full Moon of the year.

August Constellations

The constellations best seen in the southern sky are Scutum, Sagittarius, Corona Australis, Telescopium and Pavo.
Lovely deep sky objects can be observed in August in Lyra, Aquila, Scutum and Sagittarius and Corona Australis. The best known ones include the Ring Nebula (Messier 57), the Glowing Eye Nebula (NGC 6751), the Wild Duck Cluster (Messier 11), the Lagoon Nebula (Messier 8), the Omega Nebula (Messier 17), the Triffid Nebula (Messier 20), the Sagittarius Star Cloud (Messier 24) and the Condor Galaxy (NGC 6872).

Challenge for the month

On 9 August, early morning, e.g. 05:00 make a sketch of the crescent Moon near Jupiter, Pleiades and centre region of Taurus. **Ω**

NOTICE BOARD

NEA search. Discover near Earth asteroids (NEAs) in images taken by the Catalina Sky Survey. (NEAs are asteroids that have orbits that are close to Earth's orbit, and therefore pose a danger to Earth.) Volunteers from around the globe are invited to join.
The Daily Minor Planet | Zooniverse - People-powered research

UAP's again. Recent claims by an ex-US intelligence agency whistle blower about alien spacecraft crash landings have been met with scepticism by scientists – not least over the galactic visitors' driving skills!
Are aliens that bad at parking? What we need to ask about recent UFO revelations | Alien life | The Guardian

Quantum computers could be truly useful in just two years. This is relevant to astronomy. A lot of research in astronomy nowadays has to do with processing huge masses of data - obtained from modern telescopes - on computers. Greater computing power will result in better astronomical data processing capability.
Quantum Computers Could Be Truly Useful in Just Two Years (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: BepiColombo

BepiColombo - launched on 20 October, 2018 - made its 3rd flyby of the planet Mercury on 19 June 2023. Why does it do all the flybys and not go straight to Mercury and go into orbit around it? Because they will keep the craft from being pulled into the Sun's gravity well. With each flyby, it loses energy. With 1 Earth flyby, 2 Venus flybys, and 6 eventual Mercury flybys, BepiColombo will ultimately lose enough energy so that Mercury will capture the craft and it will go into orbit around Mercury. This will happen on December 5, 2025. From then on, we shall see many more images of Mercury. Read more and see a video clip at:

3rd Mercury flyby for BepiColombo, images coming soon! (earthsky.org)

Astronomy related images, video clips and documentaries on the Internet

EarthSky | Solstices and equinoxes in a video from space

Sun activity: Spectacular dark filament eruption (earthsky.org)

Astronomy basics: White dwarf stars

What are white dwarf stars? How do they form? (earthsky.org)

Report of the observing evening on June 23rd 2023 – by Michael Poll & Johan Smit

A cloudy morning broke up at midday and it was clear for observing, although not as good as last month. When driving to the school, Johan noted the brown blanket of smoky air – we can see what we are breathing in! – and this smog contributed to the not-so-good seeing. It is also the winter grass burning season.

Six people attended: Johan S, Danie, Michael, Chris, Wernard and Isabella. Sunset was at 5.25 pm so we got started early(ish). Fortunately all the floodlights around the cricket ground went off at 6.00 pm while it was still twilight. The Moon and Venus drew first attention, the Moon at an elongation 60° east showed a slightly larger phase than Venus at elongation 43° east. Mars was just above Venus at magnitude 1.6, but was not easily noticeable in the twilight. (This is the first time we have recorded seeing the Moon at an observing evening since May 2019.)

Michael and Chris looked at a number of double stars. The 5 day old Moon made a flat isosceles triangle with Regulus (Alpha (α) Leonis) and Algieba (Gamma (γ) Leonis). Gamma is a double star, with components of 2nd and 4th magnitudes, at a separation of 4": a fairly easy split in a six inch telescope. Gamma also has a slight orangey colour compared with the blue of Regulus. Gamma is a true binary with a period of more than 500 years.

The next double was Beta (β) Scorpii with a total magnitude 2.6, the components are 2nd and 4th magnitude and the separation 13.5". Near to Beta is Nu (ν) Scorpii, which comprises two stars of magnitudes 4.0 and 6.3, which are 43" apart. More doubles in Scorpius – Sigma (σ) Scorpii has components of magnitude 2.9 and 7.8, separated by 20". On this evening the companion was but a tiny speck in a 6" telescope. The naked eye double Mu (μ) Scorpii is a fine line of sight double with μ_1 at magnitude 3.0 and μ_2 at 3.6. They are 6 minutes of arc, or 0.1 degree apart

Just to the south of Mu is NGC 6231, a grand open cluster lying just north of the bright pair Zeta$_1$ (ζ_1) and Zeta$_2$ (ζ_2) Scorpii. (Although close together in the sky, Zeta$_1$ and Zeta$_2$ are unrelated). It could be said that NGC 6231 looks prettier in binoculars than in a telescope, because the surrounding star field overflows the field of view in the telescope. The region as a whole is known as the "False Comet". Two other open clusters in Scorpius are well known: M7 ("Ptolemy's Cluster") and M6 (the "Butterfly Cluster"). These last two were a bit low down and somewhat washed out by the city sky.

On to more doubles: Alpha (α) Centauri, which is now easy to split after the 2015 close approach, and Alpha (α) Crucis. The latter comprises a tight double, with a third star quite widely spaced from the pair. While the first pair are gravitationally bound, it is not firmly established as to whether the third component is a part of the system, or a more distant line-of-sight star, although some references state that all three have a common motion through space, suggesting that they *are* related. Gamma (γ) Crucis is the only red star of the four brightest Southern Cross stars. In the telescope the star is seen to be a wide double, but, like Mu and Zeta Scorpii, this is also a line-of-sight ("optical") double, the fainter companion is much further away. While in Crux we looked at the Jewel Box - NGC 4755.

The last double was Alpha (α) Librae which has the name beloved of those who wish to roll it off the tongue: Zubenelgenubi. This is a very wide double, the components are 230" apart and can easily be split with binoculars. In the past, observing Alpha Librae has led to a discussion about "when are two stars, close together, designated as a binary". The simple definition is that a binary is a star appearing as one to the naked eye but which becomes double or multiple with optical aid. (Continued on next page.)

(Continued from previous page.)

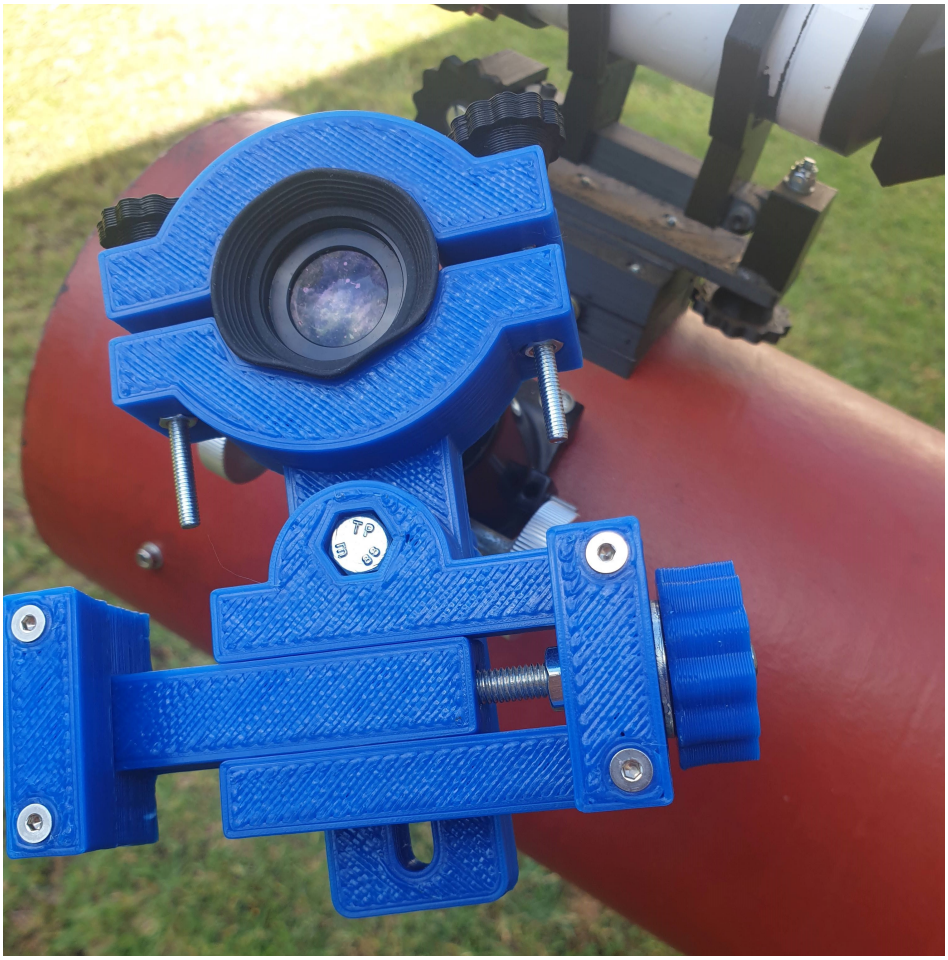
Even so, in some cases they still seem to be too far apart. In the case of Alpha Librae, because of the wide separation, it has been debated as to whether or not they were related, but they do have the same proper motion through space, so Alpha is a true binary, although the components are separated by 5400 Astronomical Units. $Alpha_2$ is the brighter of the two at magnitude 2.7, $Alpha_1$ is magnitude 5.2. This apparently anomalous labelling comes from the fact, that whatever the brightness of the individual stars in a multiple, they are numbered in order of Right Ascension. A rare event occurred in October 1978 – Uranus passed between these two stars: see image below from Stellarium.

Johan tested an adapter of his own design that clamps a cell phone to an eyepiece and managed to capture one useful image, before he got busy with the visitors. (See images of the Moon and the adapter on the next page.).

During the evening Johan looked at the Moon (obviously), Venus and even Mars, and despite the non-optimal conditions, had a look at some favourites. The enthusiastic participation of Isabella motivated Johan to try and show her as much as he could. They did a tour that included M6, M7, the Wishing Well Cluster, Jewel Box and Omega Centauri, which was surprisingly well visible. Despite the bad seeing, Ruby Crucis (DY Crucis – it is a variable) was just visible, and its colour led to an explanation of stellar evolution. Johan had a look at Antares to show its colour and compared it with Mars. At low power the two looked remarkably similar. This led to explaining how Antares got its name: Mars is named after Ares, the Greek God of War and Courage. Because the two pass close to each other regularly and look similar, the name Antares was given to the star, meaning “Not Ares”. Isabella, being of Greek descent, enjoyed the Greek mythology thrown in - perhaps there is a case for telling more of the mythological stories at such evenings – such stories are surely enjoyed by all ages.

We were getting along fine, but at 8.00 pm all the floodlights around CBC switched on and dazzled our dark adapted eyes and stopped us in our tracks - we had been in a load shedding window! A case of bad light stopped play, so to speak. **Ω**

The images below go with the observing evening report on the previous two pages.



Report of the meeting on 28 June 2023 – by Johan Jordaan

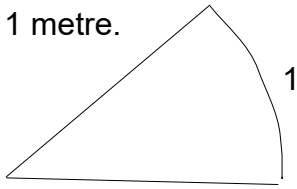
After the ”What’s Up?” presentation by Bosman Olivier, Andrie van der Linde gave a presentation titled “Radians and degrees”. It was about astrophotography. Her follows a summary of it.

Andrie said you have to match your telescope, mount and imager to your requirements. He referred to the important aspects of astrophotography as stability, sizing/matching, weight and budget. The characteristics of the main types of telescopes were discussed: Standard telescopes comprise of reflecting, catadioptric and refractor while specialist telescopes include solar, astrograph, Ritchey-Cretien, Sciefspiegler, Dall-Kirkham, etc. Reference was made to various types of mounts and imagers and sensor sizes.

The basics of optics relates to focal length and focal ratio in terms of image size, exposure and detail. Angles can be measured with the following systems:

DMS: degrees, minutes and seconds where one degree equals 60 minutes of arc and 1 minute equals 60 seconds of arc.

Radians: A radian is the angle subtended by an arc of one unit length at a distance of one unit length as shown in the sketch below. A milliradian is the angle subtended by an arc of 1 mm length at a distance of 1 metre.



The following calculations can be utilized to determine the size requirement of the sensor of the camera or imager for a given astronomical object:

- Omega Centauri (36’ 18”/0.61°/10.64 mR)
- 1000mm Focal length (1 m)
- S = L tan Θ
  = 0.0106m
  = 10.6mm

S = L (m) Θ (mR)
= 10.64 mm

A calculation of a telescope’s focal length was provided in terms of the size of the Great Orion Nebula:

- Sensor active area: 8mm x 10mm
- Great Orion Nebula: 85’ x 60’
- 85’ = 0.024725 mR

L = S / tan Θ
= 12 / 0.02473
= 485.23mm
= 0.58523m

L = 12 / 0.024725
= 485.33mm

Andrie concluded the presentation with advice for a beginner astrophotographer: Start with an Apochromat with small aperture and low focal ratio (small image/wide field/forgiving), and small equatorial mount and any available camera with possible migration to a CCD camera. This will allow the novice to learn the basics of astrophotography. **Ω**

Observing: Beautiful spiral galaxy Messier 61 - by Magda Streicher

Messier 61 aka NGC 4303 is one of the largest spirals, and is situated one degree north of 16 Virginis and five degrees from magnitude 3.8 Eta Virginis. The intermediate barred spiral galaxy displays a bar face-on in a slightly north east to south west direction with a stellar core and hints of mottling on the surface. With even higher magnification and a relatively larger telescope try to glimpse the dark streaks between the arm sections and the nucleus. The galaxy is situated about 50 million light-years distant and to me is one of the most outstanding deep sky objects. According to astronomers it is not known why the central bars in some spiral galaxies rotate around the disc at speeds different from that of individual stars. The very faint galaxy PGC 39967 is situated just 5**'** towards the south west, but cannot be spotted. **Ω**

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

OBJECT	TYPE	RA	DEC	MAG	SIZE
NGC 4303 Messier 61	Spiral galaxy	12 h 21.9 m	+ 04° 28.4'	9.7	6.5' x 5.8'

Image of M61 taken by the Hubble Space Telescope

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**

Pretoria Centre committee

Chairman	Johan Smit	072 806 2939	johanchsmit@gmail.com
Vice Chairman	Bosman Olivier	082 883 1869	bosman.olivier@gmail.com
Secretary	Michael Poll	074 473 4785	pollmnj@icon.co.za
Newsletter Editor	Pierre Lourens	072 207 1403	pierre.lourens@vodamail.co.za
Librarian and Webmaster	Danie Barnardo	084 588 6668	daniebar403@gmail.com
Public Relations Officer	Bosman Olivier	082 883 1869	bosman.olivier@gmail.com
Observing Coordinator	Neville Young	083 303 2840	nevyoung@gmail.com
Treasurer and Membership Secretary	Michelle Ferreira	073 173 0168	michellem.ferreira@standardbank.co.za
Curator of Instruments	Johan Jordaan	082 373 3395	jjordaan121@gmail.com
Additional member:	Neville Young	083 303 2840	nevyoung@gmail.com