The PRETORIA CENTRE

of the

Astronomical Society of Southern Africa

www.pretoria-astronomy.co.za

NEWSLETTER OCTOBER 2024

NEXT MEETING

Venue: Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.
Date and time: Wednesday 23 October at 19h00.
Programme:

- "What's up in November and December" by Danie Barnardo.
- Main talk: "Astrophotography with a cellphone" by Johan Jordaan.
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Danie Barnardo.

NEXT OBSERVING EVENING

Friday 18 October from sunset onwards near 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.

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Editor's chatter: The Nancy Grace Roman Space Telescope

The Nancy Grace Roman Space Telescope is a telescope in development and scheduled to be launched to orbit the Sun at Lagrange point L2 by May 2027. The Sun, Earth and L2 remain aligned in a straight line as Earth orbits the Sun. There the telescope will be 1.5 million kilometers away from the dark side of Earth, and will be permanently in Earth's penumbra. An observer moving with the telescope at L2 would see a permanent annular eclipse of the Sun - eclipsed by Earth.

The telescope is based on a 2.4 m diameter, wide field of view primary mirror. That's the same size as the HST. It will carry two scientific instruments.

The Wide Field Instrument (WFI) is a visible and near infrared imaging camera, providing a sharpness of images comparable to that achieved by the imaging cameras on the HST, **but over a 0.28 square degree field of view, 100 times larger than that of the imaging cameras on the HST.**

The Coronagraphic Instrument (CGI) is a high contrast, small field of view camera and spectrometer covering visible and near infrared wavelengths using novel starlight suppression technology. The CGI will block out the light from a star (just like the coronagraph of a solar telescope blocks out the Sun's light for studying the Sun's corona) in order to make observations of exoplanets orbiting the star. The CGI is designed to detect planets 100 million times fainter than their stars, or 100 to 1000 times better than existing coronagraphs designed for this purpose. The CGI will be capable of directly imaging reflected starlight from a planet akin to Jupiter in size, temperature and distance from its parent star. It is also expected to find another 100000 exoplanets in the first 5 to 10 years after launch.

Initially, the telescope will survey our galaxy using the WFI, making observations every 15 minutes around the clock for more than a year. What a mass of data it'll collect in this time! The astronomers will have to do data mining on a grand scale. But with modern computers it can be done. The data will enable astronomers to track the brightness changes in stars, which could lead to discoveries of exoplanets, rogue planets, isolated black holes and more.

The telescope is also expected to answer fundamental questions about exoplanets, about dark energy and about what astronomers call the cosmic dawn. It will also eventually measure the light of 1 billion galaxies. **Ω**

The observing evening of 20 September 2024

This observing evening was cancelled for two reasons. Firstly, the school had their grade 12 farewell party. There were too many people on the premises. Secondly, the weather made any astronomical observing outside impossible. It was ice cold and completely overcast with intermittent rain. **Ω**

Astronomy related articles on the Internet

✗ Pluto mission and SA astronomers. Pluto mission: South African astronomers join forces with NASA to learn more about the dwarf planet (msn.com)

✗ The hypothesis that Betelgeuse has a companion with mass = $2M_{\odot}$ explains some odd things about Betelgeuse, but the companion has not been spotted.
A New Theory Posits Supergiant Star Betelgeuse Might Actually Be Two Stars (popularmechanics.com)

✗ The purpose of NASA's DART mission was to do an experiment. The DART spacecraft was impacted on the moonlet Dimorphos of asteroid Didymos, in order to see if the impact could successfully alter the moonlet's orbit. DART impacted the moonlet in 2022 and the collision altered the asteroid's orbit. This was a first step in developing technology to deflect asteroids heading for Earth.
When the DART mission struck an asteroid moon (earthsky.org)

✗ Why technosignatures from solar panels might be unlikely.
Why technosignatures from solar panels might be unlikely (earthsky.org)

✗ Asteroids have hidden moons.
Over 350 asteroids have hidden moons, Gaia space telescope finds | Space

✗ T Coronae Borealis expected to erupt soon.
Astronomers prepare for once-in-a-lifetime event: A 'new star' in the night sky | Space

✗ According to the general theory of relativity, wormholes can exist.
Wormholes Could Be a Portal for Interstellar Travel (popularmechanics.com)

✗ Knowledge of black holes has increased a lot in the past 25 years.
In the last 25 years, black hole physicists have uncovered the unimaginable | Space

✗ Binary pair of supermassive black holes.
These 2 monster black holes may be the closest pair ever discovered in visible and X-ray light (video) | Space

✗ Rare star cluster. Rare Milky Way star cluster is packed with red supergiants 1 million times brighter than the sun | Space

Observing: NGC 660, a ring around – by Magda Streicher

Galaxies can merge into one another at a slow pace or just smash into one another on their journey through the cosmos. NGC 660 is situated in the constellation of Pisces very close to the western border with the constellation Aries. It is catalogued as a polar ring galaxy – a very rare type of galaxy in which an outer ring of gas and stars rotate over the poles. Some astronomers think that most of them form due to a gravitational interaction that results when a much smaller galaxy has a head-on collision with a larger galaxy. Ring galaxies could also be the result of passing giant galaxies stripping gas from one another. The ring structure around NGC 660 glows with clouds of hydrogen gas and bright blue stars.

It is impossible to see the ring through ordinary amateur telescopes, but with favourable dark night vision the galaxy might be seen as a fairly hazy oval. What stood out for me with high magnification was that the southwestern part of the galaxy fades out more than the slightly defined southern part. The nucleus is not at all outstanding, there is just a slight brightening towards the middle area.

William Herschel discovered this galaxy on the night of 12 September 1784. **Ω**

OBJECT	TYPE	RA	DEC	MAG	SIZE
NGC 660	Galaxy	01 h 43.0 m	+13° 38.3’	11.2	9.2’ x 4.2’

NGC 660. Picture credit: Gemini Observatory/AURA.

Summary of the meeting held on 25 September 2024 - by Johan Jordaan

The meeting started at 07h15. The usual number of people attended the meeting at CBC at Mount Edmund, comprising of 7 attending in person and 13 attending remotely through Jitsi video conferencing. Two people attended the meeting for the first time and expressed their keen interest in the endeavours of the Pretoria ASSA branch. Johan Jordaan presented the What's Up in the form of seven endeavours for October 2024:

FIRST ENDEAVOUR: Two lunar h

SECOND ENDEAVOUR: Moon's movement between Jupiter, Mars and Pollux

THIRD ENDEAVOUR: View comet C/2023 A3 (Tsuchinchan-ATLAS)

FOURTH ENDEAVOUR: The Moon occults Antares

FIFTH ENDEAVOUR: The Moon occults Saturn

SIXTH ENDEAVOUR: Two nebulae in Aquarius

SEVENTH ENDEAVOUR: Three globular clusters in Tucana and Sagittarius:

- **47 Tucanae (NGC 104)**
- **Summer Rose Star, M55, (NGC 6809)**
- **Chandelier Cluster, NGC 6723.**

The main topic of the evening:

POLAR ALIGNMENT - BY JOHAN SMIT

To perform polar alignment, we must realize that all objects in the sky move west and referring to the centre of the earth in combination with the compass' cardinal points. Right ascension and the siderial day was explained. The equatorial mount was discussed as solution to the tracking of the night sky while eliminating field rotation.

Johan provided a full overview of the steps required in polar alignment:

Set up the mount, park the scope properly, eliminate cone error specifically by correcting the Collimation in Hour Angle Error (CH), drift alignment as part of polar alignment. Two variations were mentioned: Polar alignment for visual work and polar alignment for astrophotography. There are several polar alignment routines that are generally used:

- Two star polar alignment (visual), utilizing one star close to the meridian and the other near the horizon, and correcting the drift of each by correcting the Azimuth and Altitude settings on the telescope.
- PHD polar alignment through guiding.
- DARV (Drift alignment by Robert Vice) utilizing a camera.

He introduced his own novel method of polar alignment, using only a camera and common sense:

Starting procedure (mount still not powered up):

- First find out where the RA axis is pointing.
- Point anywhere in the sky—at bright stars.
- Open shutter—bulb mode.
- Loosen RA clutch.
- Rotate the mount around the RA axis.
- Close shutter.
- Create circular trails. (Continued on next page.)

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How to find the exact pole in the photo frame:

- Lock the RA and DEC clutches!
- Do not disturb DEC or the camera.
- Move the mount to point where you think the pole should be.
- Take a long exposure (15 to 30 minutes).
- Now Earth's rotation creates circular trails.
- The centre of these trails is the location of the pole.
- Adjust the mount's altitude and azimuth.
- Do not touch RA or DEC!
- Centre the trails in the frame.

Now you know that the RA axis is pointing at the pole.
This method can be used on any type of mount, costs nothing, only a little time.
On how much guiding you need, the following advice was given:

- For perfect polar alignment = only RA guiding is required.
- Most guiding problems are caused by DEC backlash.
- Important to do polar alignment well.
- Apart from proper polar alignment, other common causes of star trailing were outlined that should be taken into consideration.

The tip of the day:

Utilize **Synscan Init** on your smartphone as an App to have on hand the values required for inputs into the handset of the EQ mount: It instantly provides the coordinates, time zone, date, time and the Polaris Position.

The final advice was that polar alignment should not be attempted for the first time at a dark sky weekend, since it is a recipe for frustration. Practice polar alignment at home until you can set up and use your equipment blindfolded.

The meeting was adjourned at 09h10 whereafter Michael Poll provided the usual refreshments. **Ω**

Astronomy basics: The blink of an eye

What happens in the Universe during the blink of an eye? Find out:

In the Blink of an Eye: Space in an Instant (youtube.com)

Summary of "What's up for November and December 2024" - by Danie Barnardo

Moon phases:

November.
New moon: 1 November First quarter: 9 November Full moon: 15 November Last quarter: 23 November.
December:
New moon: 1 December First quarter: 8 December Full moon: 15 December Last quarter: 23 December New Moon: 31 December.

Best observing from 1 to 9 November and 22 to 30 November and the same period in December.

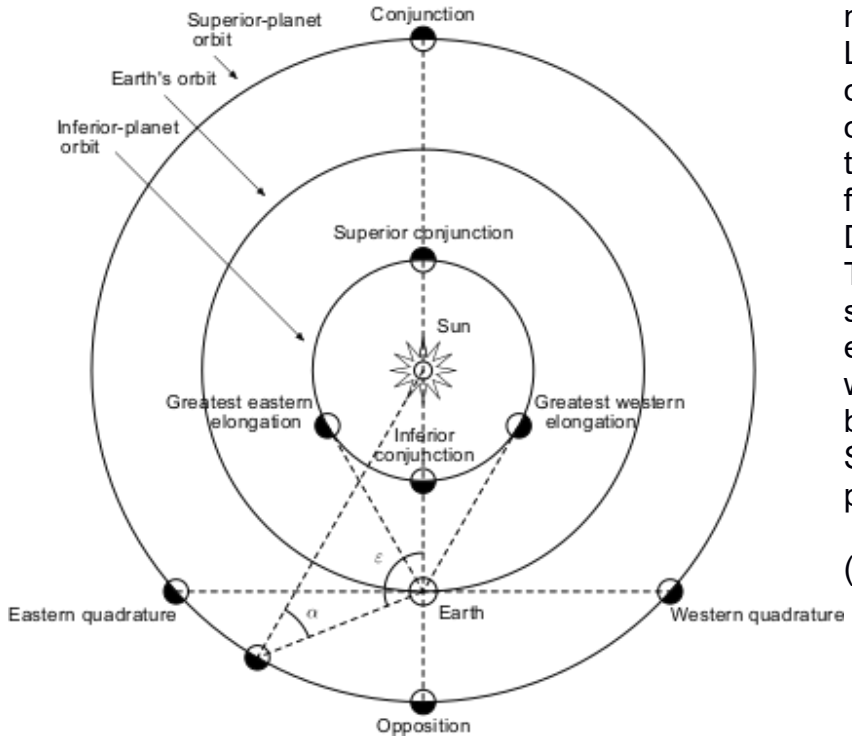
Planets:

Mercury is at greatest eastern elongation on 16 November and is visible for the entire month after sunset and fades from view at month's end, when it gets too near to the Sun. November presents a very good opportunity to spot this planet. Mercury is at western elongation on 25 December. Venus is visible after sunset for the whole month, setting at about 21h30 at the beginning of the month and about 22h00 at month's end.

Venus reaches greatest eastern elongation on 5 December.

Mars rises just after midnight at the beginning of the month and earlier and earlier towards month's end, rising at about 22h30 on the 30th of November. Jupiter is in the sky for the entire month, setting at about 02h30 at the beginning of the month

Saturn is in the evening sky for the whole month, setting at about 02h00 at the beginning of the month and at about 12h30 at month's end. Uranus and Neptune is also visible for most of the night during the whole month, Neptune setting at about 03h00 at the beginning of the month and at about 01h00 at month's end, while Uranus is visible for most of the night, setting at 04h00 towards month's end. December is a bumper time for planetary observing and all the naked eye planets, except for Mercury, are visible for most of the night. The Leonids meteor shower, originating from Leo, peaks on 17 and 18 November and the Geminids, originating from Gemini, on 13 and 14 December



The diagram on the left shows various possible elongations (ε), each of which is the angular distance between a planet and the Sun from Earth's perspective.

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Conjunctions:

Moon, Venus and Antares on 4 November at 20h50.
Mercury and Antares on 9 November at 19h15.
Moon and Saturn on 11 November at 19h30.
Moon, Pleiades and Uranus on 15 November at 21h00.
Moon and Jupiter on 17 November at 23h30 Moon and Mars on 20 November at 04h00
Moon and Venus from 3 to 6 December.
Moon and Saturn on 7 and 8 December.
Moon and the Pleiades on 13 December.
Moon and Jupiter on 14 and 15 December.
Moon near Pollux and Castor in Gemini on 17 and 18 December.

On 24 December Venus occults a star (HD 204606) in Capricornus

Constellations:

Being the end of spring, the summer constellations are coming into view and are becoming prominent towards year's end. Puppis, Canis Major, Orion and Taurus especially are becoming more and more prominent. The constellations of Aquarius, Pegasus, Aries and Cetus are still prominent. The magnificent globular cluster, 47 Tucanae is visible in the constellation of Tucana. The constellation of Sculptor and the Silver Dollar Galaxy are visible near the zenith and the Andromeda Galaxy, the nearest galaxy to the Milky Way, in the west. **Ω**

Astronomy related images, video clips and documentaries on the Internet

- Impact craters on Earth. Amazing meteorite and asteroid impact craters (msn.com)
- Mercury. https://www.msn.com/en-za/lifestyle/travel/fascinating-facts-you-didn-t-know-about-the-planet-mercury/ss-AA1oDkPd?ocid=winp1taskbar&cvid=46b3ebdfc96d4fafba871f352825e847&ei=49#image=1
- The Moon. 20 facts you didn't know about the Moon (msn.com)
- Stellar mass black hole. Astronomers discover most massive stellar black hole in the Milky Way | Watch (msn.com)
- See a simulation of a black hole ripping apart and devouring a star.
What happens if you throw a star at a black hole? Things get messy (video) | Space
- Map of the Milky Way.
A map of our Milky Way made of over 1.5 billion images has been revealed (msn.com)
- Comet Tsuchinshan-ATLAS.
Photographs of comet Tsuchinshan-ATLAS - Search Images (bing.com)

NOTICE BOARD

Eclipsing Binary Patrol. You can help to check real data from the TESS space telescope. Eclipsing Binary Patrol — Zooniverse

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.

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 "2024 SKY GUIDE Southern Africa". Ω**

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