The PRETORIA CENTRE

of the

Astronomical Society of Southern Africa

www.pretoria-astronomy.co.za

NEWSLETTER NOVEMBER 2022

NEXT MEETING

Venue: Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.

Date and time: Wednesday 23 November at 19h15.

Programme:
- **Main talk:** "Autoguiding adventures" by Neville Young.
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Bosman Olivier.

NEXT OBSERVING EVENING

Friday 18 November 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. **See "A note about the next observing evening on 18 November" on page 7.**

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Astronomy related articles on the Internet

EarthSky | Earth-like ocean planets plentiful for red dwarf stars?
Some studies suggest that worlds similar to Earth - "beach worlds" where salty oceans and land coexist - might be rare. Now scientists in Japan say otherwise. For now, the matter seems undecided.

EarthSky | How likely is an Earth-like origin of life elsewhere?
Retired astrophysicist Daniel Whitmire says that an Earth-like origin of life (abiogenesis) is probably very likely on other rocky worlds similar to our own.

The Webb Space Telescope Sees a Solar System's Beginning - The Atlantic
Orion 294-606 is a protoplanetary disk, aka a proplyd, situated in the Orion Nebula.

4 keys to understanding moon phases | EarthSky

A Monster Black Hole Has Been Discovered Nearby Silently Minding Its Business : ScienceAlert
This black hole was discovered in the data gathered by GAIA. It has a mass of roughly $12M_{\odot}$ and is located about 1550 light-years from Earth.

EarthSky | Algol the Demon Star of Perseus
Algol is an eclipsing binary.

Ancient Ghost Galaxy Hidden In the Milky Way's 'Zone of Avoidance' (Weekend Feature) - The Daily Galaxy
An enormous ‘ghost’ galaxy was detected lurking on the outskirts of the Milky Way. It had avoided detection because of its extremely low density and the fact that it is located behind the central part of the Milky Way**.**

The Mystery of Neptune's Great Dark Spot - The Daily Galaxy

EarthSky | New sun-hugging asteroids: ‘Biggest in 8 years’

Alien technology might signal extraterrestrial life (earthsky.org)

EarthSky | Ancient ocean on Mars confirmed?

Astronomy related images, video clips and documentaries on the Internet

NASA Finally Shows What's Inside Jupiter's Great Red Spot – YouTube

Juno Just Got The Closest View Of Europa in 22 Years – YouTube

NEOWISE: Revealing Changes in the Universe – YouTube

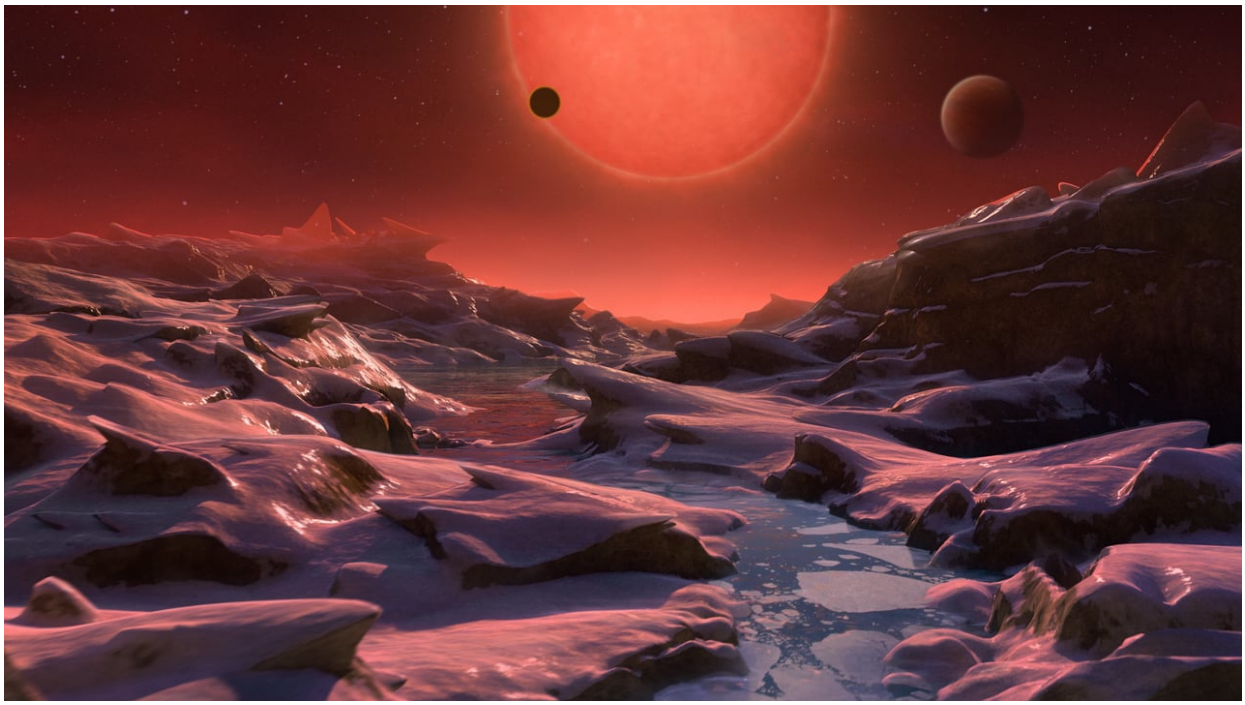
EarthSky | Cosmic Wonders on display in new Hubble video

More Than 30,000 Near-earth Asteroids Discovered by ESA – YouTube

Photos of the total lunar eclipse on November 8, 2022.
EarthSky | Photos – total lunar eclipse – November 8, 2022
EarthSky Community Photos | EarthSky

Immediately below: An artist's depiction of a scene on an **imaginary** ice-covered moon orbiting the exoplanet Kepler-16b, which actually exists. Kepler-16b is a gas giant with a mass one third that of Jupiter. It orbits Kepler-16, an eclipsing binary star system in the constellation of Cygnus.
Kepler-16 – Wikipedia

Below: An artist's depiction of a scene on the Earth-like exoplanet TRAPPIST-1e that orbits the red dwarf star TRAPPIST-1 in the star's habitable zone. The liquid water and the water ice are imaginary. Another two exoplanets, orbiting the star in closer orbits, are visible. One is transiting the star. (See also "Feature of the month" on page 7.)



What's up from November 18th 2022 to January 31st 2023 - by Michael Poll

December 2022 is opposition month for Mars (At opposition the Earth overtakes Mars so that Mars is opposite the Sun with the Earth in the middle). The Earth overtakes Mars about every two years and two months – the last opposition was on October 13th 2020 and the next one is on January 16th 2025, but at the 2025 one Mars will not be as bright as at the current opposition.

Because of Mars' eccentric orbit, the closest approach of the Earth and Mars does not occur on the actual opposition date. This year the Earth is closest to Mars on **December 1st** – when they are 81 449 000 km apart. Mars is at opposition on **December 8th** at 07h42, when the two planets are 82 217 000 km apart. (Stellarium figures)

At opposition on the night of **December 7th – 8th**, Mars will be in the sky all night (although this more or less applies to the month before and the month after opposition). Some oppositions are more favourable than others - Mars will not be as bright again until 2031. The downside is that in December this year it will be in competition with the full Moon, the Moon will be close to Mars all through the night of December 7th – 8th, they will be closest when they set at 04h30 on December 8th. However Mars will still be nearly as bright after the Moon moves away over the few days following.

Occultation of Mars January 3rd 2023

There is currently a series of occultations of Mars by the Moon occurring, and the one on **January 3rd** will be visible in South Africa. Mars will disappear at the unilluminated limb of the Moon. For Johannesburg the times are: **Disappearance 20h 43, Reappearance 22h02.** The times for Pretoria will be similar but allow plenty of time beforehand. (From what can be seen from Stellarium, disappearance for Pretoria could be about 20h35.)

On the evening of **January 30th,** the Moon will again be close to Mars. Another occultation in the series occurs, but it takes place long after they have set on the 31st, so it is not visible in South Africa.

Moon near Jupiter

The Moon will be near Jupiter all through the night of **December 1st - 2nd**. The closest approach is on Dec 1st at 23h52, when Jupiter will be 2.5°N of Moon. The Moon is near Jupiter again on **December 29th**, closest approach is during the daytime, but they will still be near each other when darkness falls. On **January 25th 2023** the Moon will be south (left) of Jupiter and on the 26th north (right) of Jupiter in the western evening twilight.

At present Jupiter is brighter than usual (magnitude -2.9) because opposition in September 2022 is very close to Jupiter's perihelion in January 2023 – so this is a "perihelic opposition". Perihelion is when a planet is closest to the Sun. At aphelic oppositions Jupiter is 1.6 times further away and can be at magnitude -1.9.

Moon near Saturn

The moon will be near Saturn on **December 26th**. They are closest at 19h11, when Saturn is 4.0°N of Moon.

Groupings

On **December 24th** low in the west in the evening there will be a grouping of the Moon, Venus and Mercury – they make an equilateral triangle with Mercury to the north (right) of the Moon, and Venus below these two. The Moon will be 30 hours old. The Sun sets at 19h00, Venus sets at 20h05 and the Moon and Mercury set at 20h20. Start looking as soon as it gets dark enough!

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On **January 23rd**, again low the west, there will be another grouping, this time it will be of the Moon, Saturn and Venus. Sunset is at 19h02, Venus sets at 20h22. The Moon will be 2.2 days old. Venus will be below it. Saturn will be a little speck just below Venus and maybe lost in twilight

Mercury and Venus

Mercury and Venus are aligned in the evening sky at the end of December, but their positions relative to the Earth are diametrically opposite – Venus is on the far side of the Sun (superior conjunction occurred on October 22nd 2022) and is now moving into the evening sky, and Mercury is passing between the Earth and the Sun - inferior conjunction occurs on January 7th 2023 and thereafter Mercury will move into the morning sky, being visible before sunrise. Venus will become easily visible in the evening sky as 2023 progresses. Inferior conjunction is on August 13th 2023.

For southern hemisphere observers, Mercury's best appearance in the morning sky occurs in the first half of the year – in 2023 it will be at its best in the second half of January and the first week or so of February. When in the morning sky, Mercury is *west* of the Sun. The greatest elongation (its greatest angular distance from the Sun) occurs on January 30th when it will be 25° west of the Sun.

Moon near bright stars

During a month, The moon passes bright stars that lie near the ecliptic and the Moon's passage makes a chance to identify these stars. Because of the Earth's movement around the Sun the Moon meets the star a few days earlier each month.

Moon near Spica (brightest star in Virgo) on November 21st, December 18th, January 14th . All events in the east before sunrise

Moon near the Pleiades on December 6th, January 2nd & 3rd, and January 30th.

On January 30th the Moon will be in the centre of a line joining the Pleiades and Mars.

Moon near Pollux (brightest star in Gemini): December 11th, late evening and through the rest of the night, and the evening of January 7th.

Moon near Regulus (brightest star in Leo): December 14th and January 11th in the east before sunrise.

Moon near Antares (brightest star in Scorpius) – in the east before sunrise on January 18th . They will be 2° apart

Meteor showers

Leonids November 12th – 21st, peak on early morning of November 17th but the last quarter Moon will interfere.

Geminids December 4th – 20th, peak on night of December 13th -14th. Some shower members may be seen before midnight, but the last quarter Moon rises at 22h40 on the 13th and will interfere for the rest of the night.

Other dates to note.

Earliest sunrise : for Pretoria: December 1st at 05h07.

Solstice: December 21st at 23h48

Latest sunset : January 11th at 19h03.

The earliest sunrises of the year in either hemisphere always come before the summer solstice. The exact date of the earliest sunrise depends on the observer's latitude, but in either hemisphere, the sequence is always the same: Earliest sunrise - solstice - latest sunset.

Perihelion : 4 January 2023, 18h17.

Distance from the Sun's centre to Earth's centre will be 147 098 925 km.

(Aphelion July 6th 2023. Distance 152 093 251 km - the Sun is 3.4% further away).

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At perihelion the Earth comes to closest to the Sun for the year, and at aphelion it is at its farthest. Currently the Earth reaches perihelion in early January, about two weeks after the December solstice, and it reaches aphelion in early July, about two weeks after the June solstice.

The fact that the solstices are separated from perihelion and aphelion by only a few days is only a co-incidence – perihelion and aphelion dates are not related to the solstices - the solstices are determined by the tilt of the Earth's rotational axis, the perihelion dates are a function of the precession of the Earth's orbit. The Gregorian calendar is designed to align itself with the seasons (the *tropical year*) causing the equinoxes and solstices to fall on or near the same dates each year. If this were not so the seasons would drift around the calendar.

Perihelion is at one end of the major (long) axis of the Earth's horizontal elliptical orbit *(the line of the apsides)* The orbital plane is rotating very slowly causing the date on which the Earth reaches these points to drift as the centuries pass. Because the date of perihelion changes, it means that at certain times it *can* coincide with the December solstice – this happened last in 1246 AD. This was "only" 1000 years ago in the grand scheme of things - it has taken perihelion this long to drift away and occur about two weeks later.

Precession of the Earth's orbit causes perihelion and aphelion occur on average about 25 minutes later each year (perihelion to perihelion is the *anomalistic year)* which amounts to one calendar date later in about 58 calendar years, giving a period of about 21 000 years for one cycle. Perihelion is now moving away from the December solstice and will align with the March equinox around 6496 AD (1246+5250). Roughly 5250 years after this it will align with the June solstice, and so on, until it again aligns with the December solstice point around A.D. 22 246 (A.D. 1246 + 21 000 = A.D. 22 246).

Constellations

December : South: Grus (the Crane), Piscis Austrinus, Eridanus (the River), Canis Major. (Large and Small Magellanic Clouds)
North: Pegasus, Andromeda, Aries, Taurus, Orion.

January : South: Piscis Austrinus, Eridanus (the River), Canis Major, Carina
North: Taurus, Orion, Gemini **Ω**

A technosignature from SF

Older members will recall this scene from the 1968 blockbuster science fiction film **"2001: A Space Odyssey"** - it shows a technosignature in the form of a black monolith that was put on the moon long ago by an alien intelligent species that had created a technological civilization.

See a video clip at:
2001: Space Odyssey Best Scenes - The Monolith At The Moon - Bing video

Feature of the month: The TRAPPIST-1 star system

A star 40.7 light-years away is named TRAPPIST-1. It is orbited by no less than 7 planets similar in size and mass to Earth. The star is a very cool red M dwarf that can barely fuse hydrogen in its core; it has 9% the mass, 12% the radius, and only 0.06% the luminosity of our yellow Sun. This star system is a prime target for the recently deployed JWST, a large infrared telescope orbiting the Sun at Lagrange point L2, where the telescope is permanently in Earth's shadow.

Apart from text, there are two video clips at this link: Will the TRAPPIST-1 Star System Reveal How Frequently Life is Found Elsewhere? - The Daily Galaxy

There is more to read at this link: TRAPPIST-1 – Wikipedia

See also the artist's depiction on the bottom half of page 3. **Ω**

A note about the next observing evening on 18 November

We plan to combine an informal year end social event with our last observing session on 18 November 2022. Members and friends are invited to bring along a picnic basket. Let's wind down the year together, and celebrate the return to our traditional venue. Please make sure to leave the area in a cleaner state than how we found it.

NOTE: Consumption of alcoholic beverages and making of fires are not allowed on the school premises. **Ω**

Report on the observing evening on October 21st 2022 – by Michael Poll

The first observing evening since February 2020 - so two years and eight months have elapsed since the last one. The February 2020 report started with the words "Another cloudy night…" , and guess what? ….. Nothing has changed in all this time – it was still cloudy this month, the traffic noise is the same as ever and the tower lights at the N1/N4 interchange are still as bright.

Nevertheless, ten people came to the playing field at CBC – 6 members and four guests, and Bosman had three guests on line. Johan videoed the scene at CBC for the benefit of the on-line attendees. So….we had a bit of chat, a bit of reminiscing and then dispersed. **Ω**

NOTICE BOARD

There will be no newsletter, no observing evening and no monthly meeting in December.

NASA announces the team members for its UFO study. NASA stated that the lack of existing research on UAPs makes it difficult to draw scientific conclusions about the nature of such events and also says that there is so far no evidence that connects UAPs to extraterrestrial life.

NASA selects team for UFO study : NPR

NASA assembles team to study UFOs – YouTube

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.

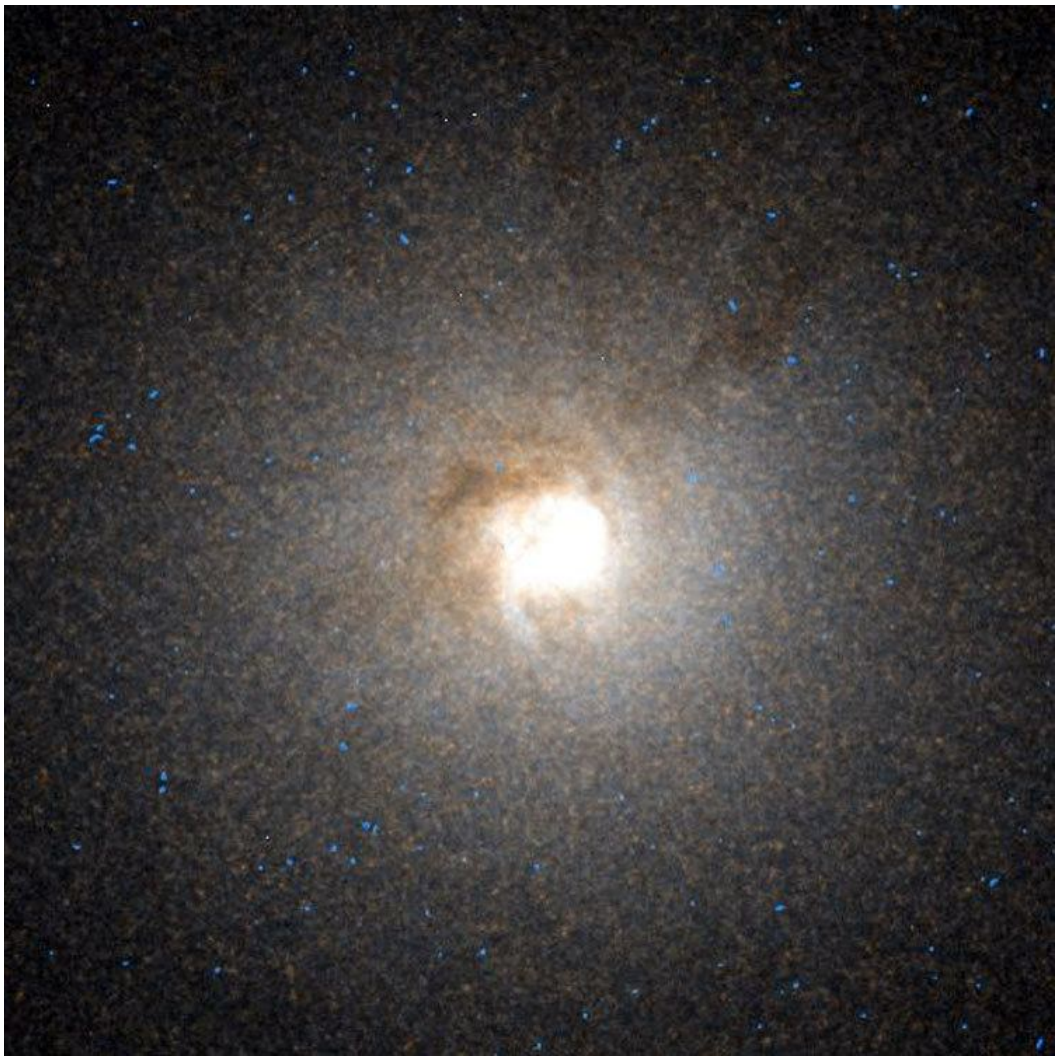
Observing: Hide and Seek NGC 404 - by Magda Streicher

If we think about the Andromeda constellation, hanging just below the great square of Pegasus this time of year, the first thought that comes to mind is “The Great Andromeda Galaxy”, also known as Messier 31. In this constellation can be found much more than a handful of galaxies - it is littered with bright and faint star cities for a popular search. One, however, catalogued as NGC 404, is playing hide and seek just 6’ north of the brilliant yellow coloured Beta Andromedae, which is only 200 light years from us. NGC 404 is by no means easy to bag, but with a few handy tips it can be done. The galaxy literally hides away in the glare of magnitude 2 Beta Andromedae, so do not try to observe them with both in the same field of view.

The best option is to move Beta Andromedae out of the eyepiece field to escape its overwhelming brilliance. No wonder it has been called Mirach’s Ghost. NGC 404 is a lenticular galaxy, quite small and not too faint to the keen eye. Through medium amateur-size telescopes the galaxy displays a hazy roundish shape with a bright nucleus. Search out the galaxy and don’t be scared of the ghost – it is a very safe 10 million light years away! **Ω**

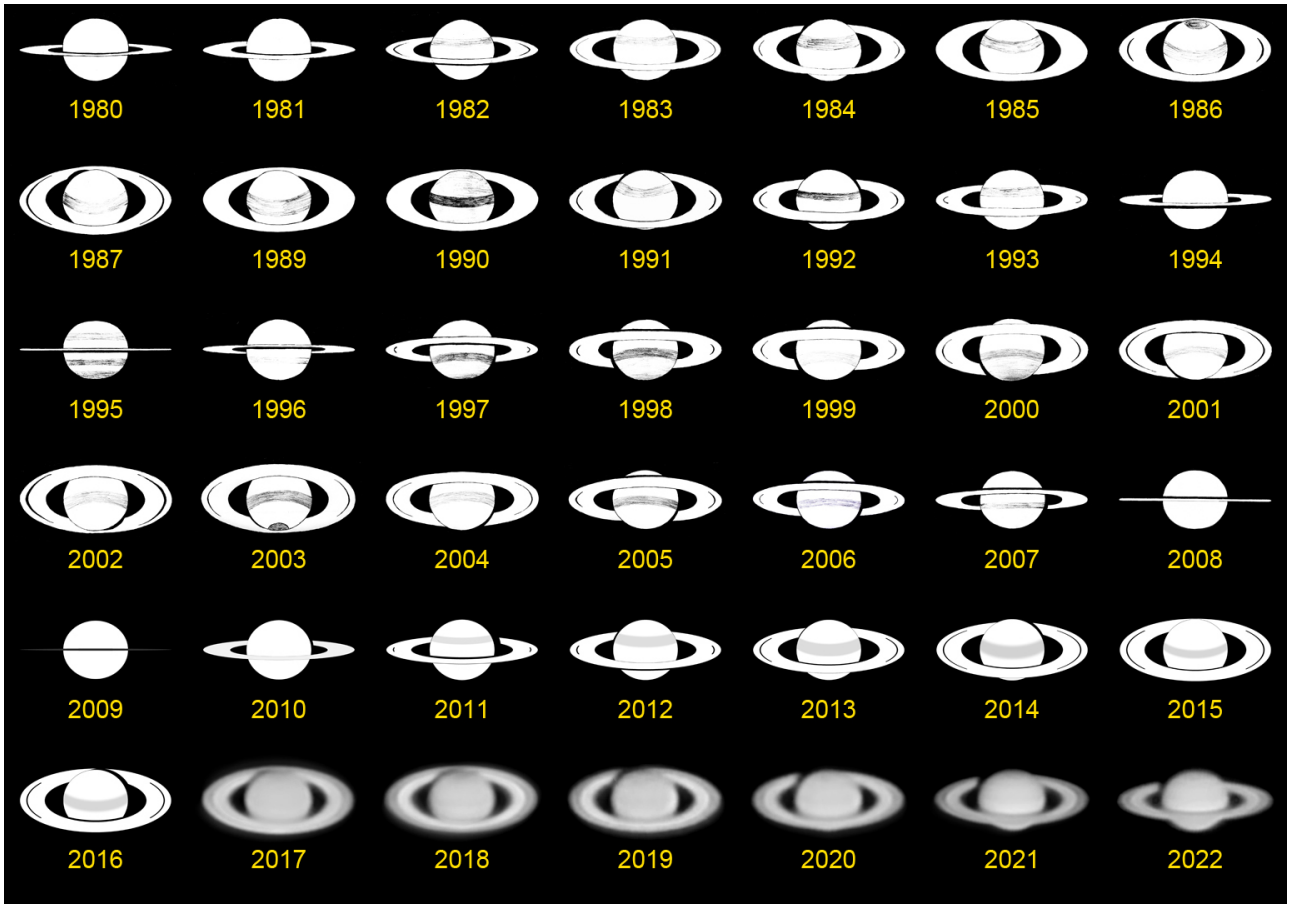
(Magda Streicher’s e-mail address: magdalena@mweb.co.za)

OBJECT	TYPE	RA	DEC	MAG	SIZE
NGC 404	Galaxy	01 h 09.4 m	+35° 43.2’	10.3	6’ x 6’



Saturn observations

Barbara Cunow has just passed the 42 year mark of her long term Saturn observations. Here are her sketches and photographs.



Astronomy basics: The armillary sphere

tropics.mp4 (sharepoint.com)

Arctics.mp4 (sharepoint.com)

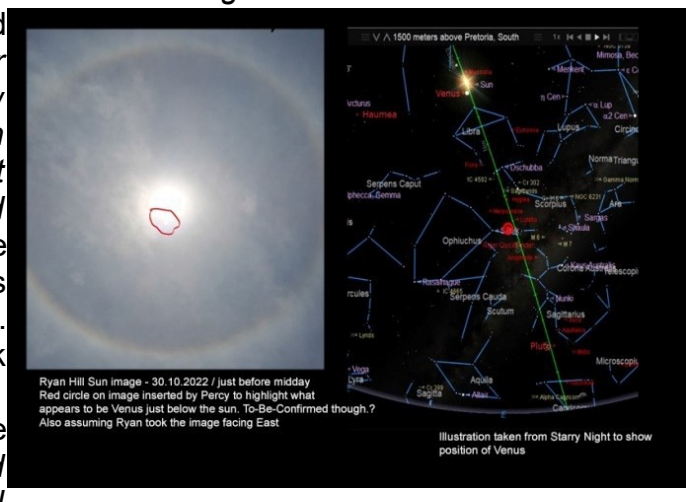
lunarphasetimes.mp4 (sharepoint.com)

Venus photographed inside a Sun halo? - by Neville Young

The observers WhatsApp group of the Pretoria Centre of ASSA is a forum for members to share their observing activities and for others to comment on them. It also provides company for those of us who are observing on their own from home, going as far as sharing virtual coffee and chocolates.

On the 30th of October, Ryan shared an image of a Sun halo that he had spotted over Bryanston in Johannesburg. (Note: astronomers do spend much time looking up!) His message said "*Sun today, cirrostratus clouds causing circular rainbow.*"

Two days later Percy responded saying "*Hi Ryan, just looking at your image again. Is this Venus just below the sun? If it is, WOW, what an unexpected catch in the photo. Look at the illustration that I have attached and see if you agree with the possibility?*" He attached this image showing that Venus had come around from behind the Sun. (Watch out for it as it soon climbs back up into the western sky.)

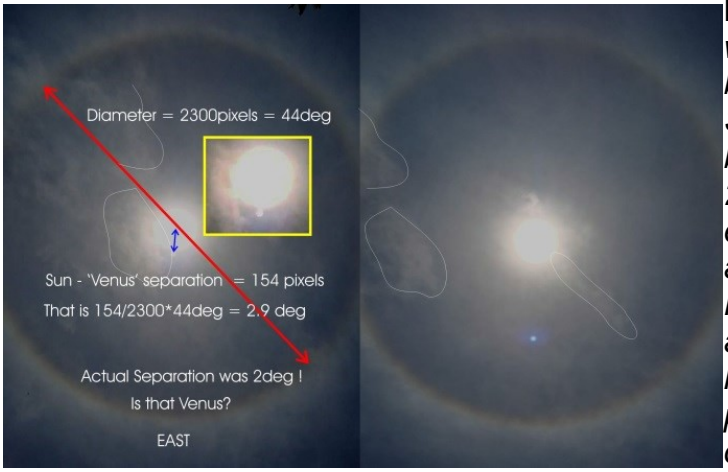


Neville couldn't resist the research and replied "*Very well noted Percy! I think you may be correct. Will do some measurements later. Wow!*" With a little bit of image processing, Neville made the spot clearer in an inverted image. It certainly looks like a round planet, full face on to us seeing as we could see it's entire illuminated side, something we cannot see too easily as this means that Venus must be close to the Sun.

Then Ryan put a spanner in our hopeful excitement by sending this image which showed a typical reflection of the Sun inside the camera optics – a blue spot.

Neville's analysis raised these enticing facts:

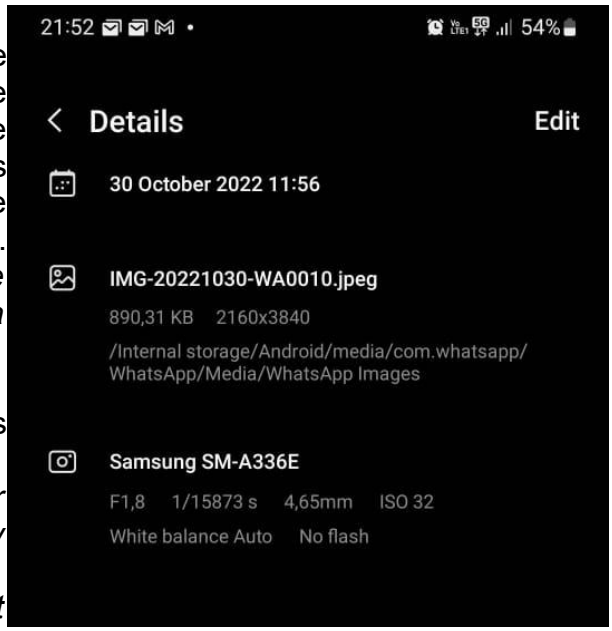
"*My analysis says neither nay nor aye. Venus was actually 2 deg 5 min from the Sun. Measurements on the image show 2 deg 55 min. The direction in which Venus lies is roughly correct. Could this have been Venus! Was this lens flare?"*



Further: "*One would think so but.....the Sun's disk was bigger on the 2nd image, which means it was over-exposed - over Venus. There are also clouds moving left to right (S to N) across the FOV which would have affected the exposure time. Do you have the actual times at which the photographs were taken? The times on WA are the times when the image was sent. The jury is not out yet. This is very interesting!*" (Contd. on next page.)

(Contd. from previous page.)

We then looked up the image exposure details of both images on the Android phone and found that they were the same, even though there were clouds moving across the Sun which would have given rise to a change in exposure settings. "*Same specs for each photo. Accurate exposure (1/15873 s) down to 1/10000th of a 2nd!! Doubtful.*"



CONCLUSION:

It was impossible to arrive at an unanimous conclusion.

Neville: "*Perhaps we will never know for sure, but I am thinking that it is highly probable that it was Venus.* "

Percy: "*Thanks for trying to figure this out Neville. A great image if in fact Venus. Like the facts Neville. Pretty convincing*"" "*Neville, thanks for your efforts. Can you measure the diameter of your "Venus" and the lens flare on the earlier image? It would seem they're about the same size.*" Yes, they were similar in size.

Wessel: "*Thought I will share an image I took in Nov 2014, used my dark glasses as a filter. Samsung S4 cellphone. Note the "spot". At the time Saturn was in that position. I was very excited. Short lived, Auke Slotegraaf assured me that I had captured a perfect image of the Sun due to some technical stuff in the lenses. Its would be very optimistic to assume that a cellphone can capture a planet with such magnification with the sSn as back light."*

Johan Moolman: "*Very interesting all. Thx for sharing yours as well Wessel.*"

Neville: "*Just a question though. In the one image from Ryan, the small circle is white and right next to the sun. In his other image, the small circle is much further away, and bluish in colour. In the image Wessel sent, the small circle is very similar to Ryan's 2nd image, bluish and further away, but not the same as the first image where the spot is white and right next to the Sun?????*"

Percy: "*OK, I concede.* [that it is not Venus] *I see a small dot next to the Sun - top left."*

Johan M: "*Optics imperfections.... camera lens plus polarising filter...*"

Neville: "*Mostly these kind of spots are artefacts arising from reflections in the optics, but the spot in Ryan's image does not look like an artefact. Investigation ongoing."*

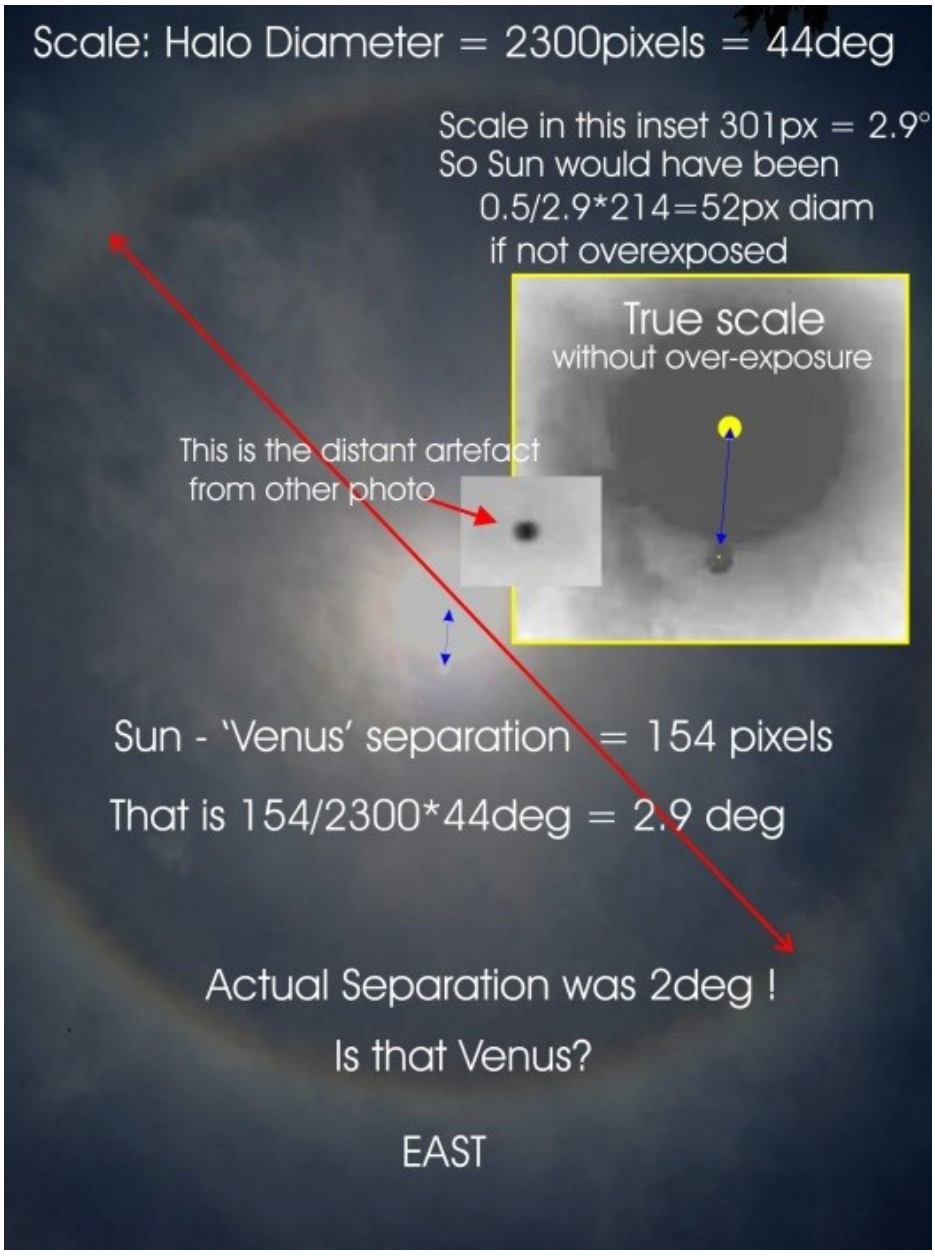
Percy: "*That's what I like to hear - maybe I'm not crazy after all."*

Ryan: "*I'm happy to be proven wrong, but I think we're looking at a lens flare and not Venus*" (Contd. on next page.)

(Contd. from previous page.)
Neville: *Arguments for and against.*
** The scale looks right. * 'Venus' was close to the correct distance from the Sun. * It was in the correct direction from the Sun.*
** The Sun bloomed many times in diameter on the image. * Would Venus also bloom in an image of that duration? * Even though it was on the far side of the Sun, its magnitude was nevertheless - 3.9. Still very bright. * The artefact from the other image looks very similar to the image of 'Venus'. * I can't say that it was Venus. (I'd like to) * Photographically an expert might be able to tell if Venus could be imaged so brightly without a nearby Sun. I suspect not. (Perhaps some test could be done with photographs of the Sun close to Venus.) * The evidence for the spot being an artefact is good. * What is an amazing coincidence is that the artefact landed where Venus probably was - although not visible!*

Finally Neville drew a diagram of the Sun and Venus at scale, which showed just how much the Sun image was overexposed.

Percy had the last word - "*I'm convinced, its Venus - 1 vote so far."* **Ω**



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,* 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
- **More web links can be found on page 118 of "2022 Sky Guide Africa South". Ω**

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