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

NEWSLETTER FEBRUARY 2025

NEXT MEETING

From January 2025 onward, we will have our monthly meetings over the Internet, and not at CBC any more.

Date and time: Wednesday 26 February at 19h00.

Programme:

- "What's up in March 2025" by Danie Barnardo.
- Main talk: A short talk to motivate members to do actual science - by Johan Smit.

The web link to join the meeting is: https://meet.jit.si/ASSAPretoriaMonthlyMeeting (See the note at the bottom of page 8.)

The chairperson at the meeting will be Danie Barnardo.

NEXT OBSERVING EVENING

Friday **(postponed from 21 February to) 28 February** 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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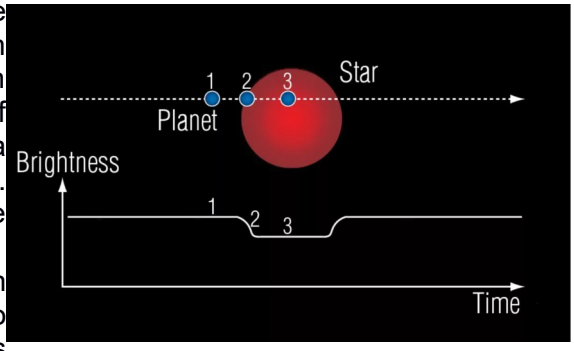
Editor's chatter: Investigating the atmospheres of exoplanets

How is this done? Note that it is only done for those exoplanets which were discovered by the transit method. Let's first look at how exoplanets are discovered by this method.

As the exoplanet moves between the observer on Earth and its parent star, the light from the star is slightly dimmed. On the right is shown the graph that is obtained when the brightness of the star is measured at different times with a photometer and plotted. This is called a light curve. It shows that the light curve has a dip when the exoplanet passes in front of it.



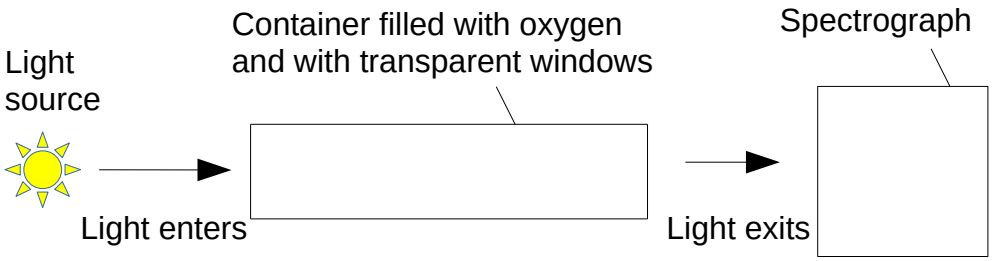
A technique known as transit transmission spectroscopy is used by astronomers to investigate the atmospheres of exoplanets. This is as follows. When the exoplanet is behind the star, the spectrum of the star is recorded. When the exoplanet passes directly in front of the star, a second spectrum of it is recorded. The two spectra are then compared.

The first thing to grasp is that when the exoplanet has no atmosphere, the light at all wavelengths from the star is *diminished by the same percentage when the planet passes in front of the star.* This is because the exoplanet blocks some of the light at all wavelengths equally.

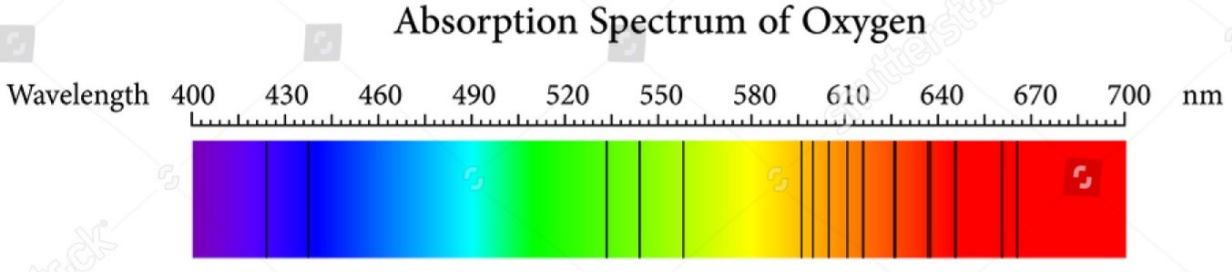
Consider now the case of an exoplanet with an atmosphere.The light at wavelengths for which the atmosphere is transparent, *will be diminished by the same percentage when the planet passes in front of the star.* But the light at a wavelength for which the atmosphere absorbs the light, *will be diminished by a greater percentage when the planet passes in front of the star.* This is because not only does the exoplanet block some of the light from the star at that wavelength, but its atmosphere also absorbs some of it.

For instance, if the light for wavelengths at which oxygen absorbs light, is diminished by a greater percentage than for those wavelengths for which it is transparent, it tells the astronomers that there is oxygen in its atmosphere.

The absorption spectra of gases are known from laboratory work. The setup in a laboratory to obtain the absorption spectrum for e.g. oxygen, is shown schematically below:



Below is shown the absorption spectrum for oxygen as registered on a spectrograph. The dark lines correspond with wavelenths (in nanometers) at which oxygen absorbs light.



Astronomy related articles on the Internet

- Binary stars discovered near Sgr A*. Astronomers discover 1st binary stars orbiting supermassive black hole at the center of the Milky Way | Space
- Superflare. What would happen minute-by-minute if a SUPERFLARE hit Earth
- Close approach by Parker Solar Probe.
NASA confirms solar probe has made record-breaking close approach to the Sun
- Solar sail technology.
Meet the ACS3: a new NASA project that could revolutionize space travel
- The Sun is now near the maximum of its 11-year cycle.
The sun in 2025 — How the solar cycle will shape our year ahead | Space
- Oceans inside moons of Uranus? NASA intends to find out. Are there hidden oceans inside the moons of Uranus? Their wobbles could tell us | Space
- Life search on Mars. We finally know where to look for life on Mars | Space
- Zombie star. Astronomers left baffled after finding 'zombie star' that shouldn't exist
- Water in space. How much water is in space?
- A doomsday asteroid named Bennu (500 meters in diameter) could hit Earth on September 25, 2135. But it has a probability of only 0.00037 of hitting Earth then. Doomsday asteroid could wipe out life on Earth in 2135 | Daily Mail Online
- A simulation of what will happen if the latter asteroid does hit Earth.
Simulation reveals what will happen if asteroid Bennu crashes to Earth
- This asteroid (90 meters in diameter) has a 0.023 probability of hitting Earth on December 2, 2032. NASA warns chances of asteroid hitting Earth have INCREASED
- Emergency decision about the latter asteroid.
Nasa makes an emergency decision over 'city-killer' asteroid heading for Earth
- A bit of history of astronomy.
On this day in space! Feb. 18, 1930: Pluto discovered by Clyde Tombaugh | Space

Report for the observing evening on January 17th 2025 – by Michael Poll & Johan Smit

Can you believe it? After weeks of total cloud cover the sky cleared for our observing evening. On many occasions it has been the other way around. On this evening there were only a few wispy bits of cirrus. We had a good crowd of members and visitors – there were more than 20 people in attendance. Johan filled a complete attendance sheet on the visitor side (10 lines, each with one person from each family). Each family was at least 2 people, not counting the children. and added to that 6 members, we were nearly 30 people.

There were at least six telescopes. One visitor, Jaco Groenewald, brought an interesting telescope. He purchased a 4.5" optic set (primary and secondary mirror), and 3D printed a complete telescope from plans available for free on the internet.

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Johan had assisted him over the last few months to get his printer to print all the parts reliably - and it worked! At the viewing evening we could enjoy the results of his efforts.

We were treated on an array of planets – Venus and Saturn near each other, the day before their closest approach of January 18th when they would be 2.2 degrees apart. Venus was showing a half phase (greatest elongation was on January 10th), Saturn's rings showed two tiny spikes. In the north was Jupiter which was in Taurus, still close to Aldebaran. Jupiter showed Io to the west and Ganymede and Callisto to the east. Our new member, Jacques Kühn identified a shadow transit in progress on Jupiter – the shadow was that of Europa. Mars was rising in the northeast at the end of twilight – it was at opposition the previous day (January 16th).

Naked eye stars noted were Capella low in the north (at declination +47° it passes more or less overhead in London), and the (northern) Winter Triangle of Sirius, Betelgeuse and Procyon.

We did a telescope tour for the visitors rather than making detailed observations: we showed the Pleaides; Tau (τ) Canis Majoris (which lies at the centre of a young open cluster NGC 2362); M41 in Canis Major; the Wishing Well (NGC 3532) in Carina; and the Nebula in Orion (M42). In addition to these targets we also looked at the Gem Cluster (NGC 3293), and Johan's favourite: NGC 2547, the Heart Cluster. The Southern Pleiades (IC 2602) were also admired while we were in that area. As well as the shadow transit, Jacques Kühn independently found 47 Tucanae.

Michael pointed out a "new" asterism which was described in Sky & Telescope for September 2022 (Page 22) - three doubles forming an equilateral triangle. The asterism is just a little way southwest of Aldebaran – the brightest pair are Theta^1 and Theta^2 Tauri. The S&T article called it a "Yield Sign", we would say a "Give Way" sign, but even that is not very original. (See image – the bright star on the left is Aldebaran)

Mars is in the middle of a triple conjunction with Pollux in Gemini. Castor, Pollux and Mars were in a dead straight line. If one wants to see planetary movement in action, watch this line change from day to day. However, the straight line was not the date of the actual conjunction – the conjunction in RA was on the night of January 21st at 19h45 and in ecliptic longitude was on January 22nd at 22h53.

Castor is now a showpiece double comprising Castor A (magnitude 2.0) & Castor B (magnitude 3.0). Both are white. We also noted Castor C (magnitude 9.0) which orbits A & B and which had an orangey colour. All three (A, B and C) are spectroscopic binaries, so the system consists of six stars. The components of C are a pair of red dwarfs, which explains the colour we saw. The separation between A and B has increased from about 2″ in 1970 to about 6″ at present. C is 71" away from A & B. (See below).

Later on when most people had left we viewed the Moon, and as Crux cleared the trees we had a look at the Jewel Box as well as the carbon star, Ruby Crucis, which is close to Mimosa (Beta Crucis).

There was quite a bit of dew around, but fortunately it did not affect the telescope optics. We "closed up shop" around 23:30.

Castor is a double star, (Castor A and Castor B) which may have been resolved by G D Cassini in 1678 but was rediscovered by James Bradley (Astronomer Royal) in 1718, although another reference says it was rediscovered by James Pound, also in 1718.

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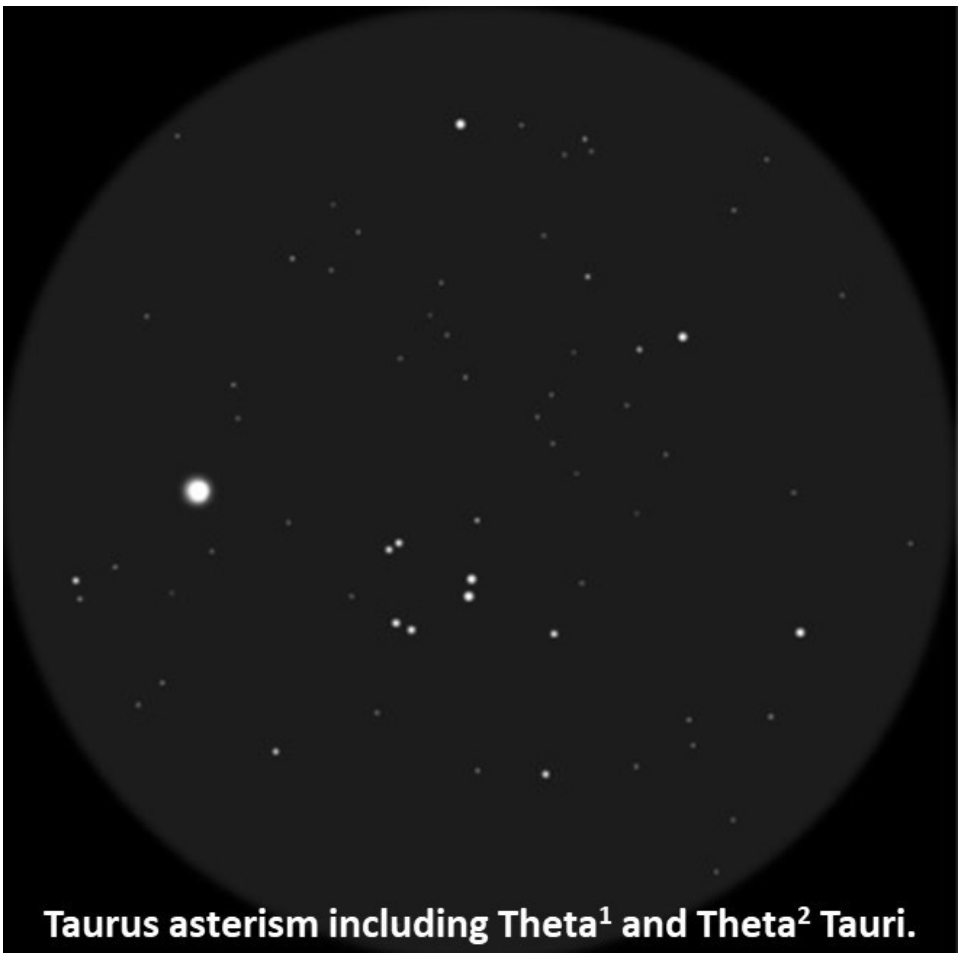
Between 1718 and 1759 a change was noted in the relative positions (i.e. in the position angle) of the two stars, and in 1803 William Herschel realised that the two stars were gravitationally bound. This was the first true physical binary to be recognized, and the first object beyond the solar system in which the force of gravity was shown to be operating. The period of revolution is about 470 years, with a mean separation of 90 astronomical units (AU). (For comparison Alpha Centauri A and B vary between 11 AU and 35 AU apart, and the mean distance of Pluto from the sun is 39.5 AU).

Extracted from the February 2004 Newsletter (written by Michael Poll):

In 1880 Castor A and B [had] an angular separation of 6.5", reducing to 3.9" in 1937, and slowly closing to a minimum of 1.8" in about 1965. The 17th edition of Norton's Star Atlas (1978) describes them as "closing: not now very easy with small apertures", so for the last few decades [of the 1900s] this fine double [was not] available to most amateur telescopes.

James Muirden in "Astronomy With a Small Telescope" (1989) states that, at a separation of 2.5", they are "a good test for a 60mm telescope" and the "Collins Gem Stars" (1999) says that Castor will be "split by small telescopes with high magnification".

However, they are now [2004] wide enough and can be separated in a small telescope. I saw them as two, for the first time ever, in my 3 inch refractor at 66x magnification on January 26th 2004, but maybe if I had looked sooner, I would have seen them then. Maybe I was not looking hard (or often!) enough, or was using too low a magnification. When did *they separate?* **Ω**



Taurus asterism including Theta^1 and Theta^2 Tauri.

Arp 273 is a pair of colliding galaxies, 300 million light years away in the constellation Andromeda

NOTICE BOARD

- ✔ **Search for asteroids around dead stars.** Exoasteroids — 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.

Astronomy basics: The bizarre characteristics of Titan

The Bizarre Characteristics of Titan | Our Solar System's Moons: Titan

Summary of "What's up in March 2025" to be presented on 26 February - by Danie Barnardo

Moon Phases:

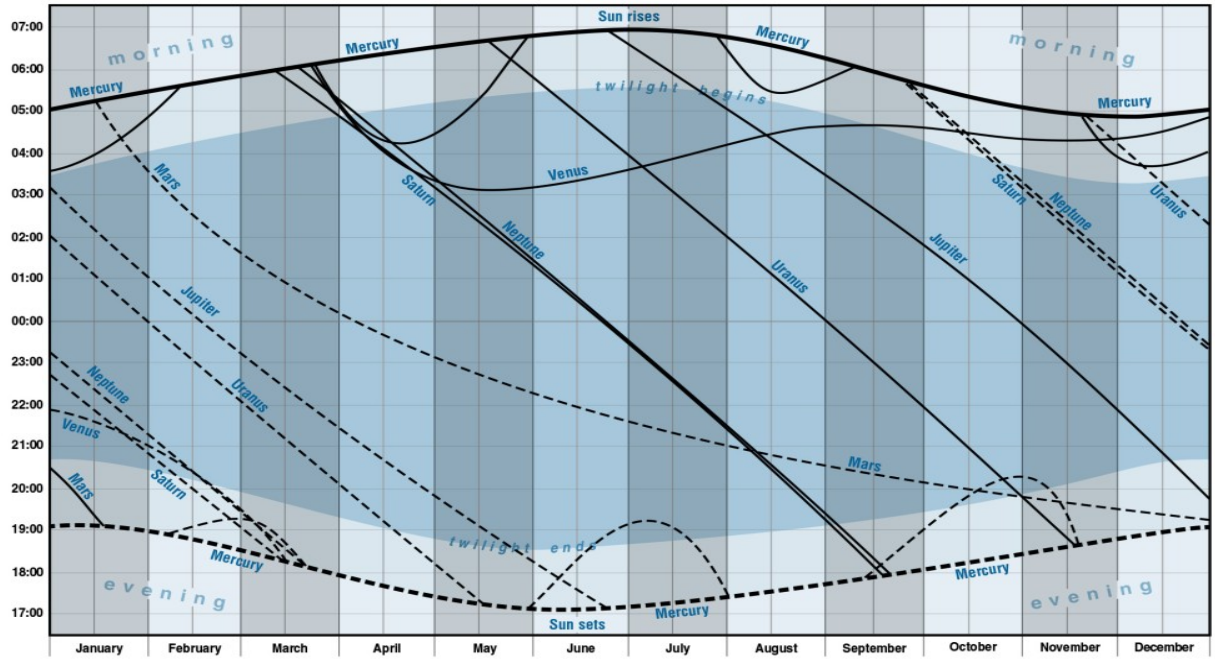
First quarter: 6 March
Full moon: 14 March
Last quarter: 22 March
New moon: 29 March
The March full moon is known as the Harvest Moon in South Africa and the Worm Moon in the Northern Hemisphere.
Best observing from 1 to 6 March and 23 to 31 March.
A penumbral Lunar eclipse will be visible in the Northern Hemisphere on 14 March, but will not be visible in South Africa and a Solar eclipse on 29 March, which will be visible in North America, Mexico, Central America, and South America.
The autumn equinox occurs on the 20th of March, and on this day the length of day and night will be about equal throughout the world. This is the start of fall (autumn equinox) in the Southern Hemisphere and spring (vernal equinox) in the Northern Hemisphere.

Planets:

March is not a good month for Planetary observing, since only Uranus, Jupiter and Mars will be visible.

March 8 - Mercury at greatest eastern elongation. The planet Mercury reaches greatest eastern elongation of 18.2 degrees from the Sun. This is one of the best times to view Mercury since it will be at its highest point above the horizon in the evening sky. Unfortunately, in South Africa, it is still twilight, due to the the Sun setting too late and Mercury will be very difficult to observe in March. However, if you have a very clear western sky, you should be able to see the planet very low on the horizon at about 19:00.

This very handy diagram is on page 72 of the 2025 Sky Guide and shows the rise (solid lines) and set (dashed lines) times of the planets during 2025.(Continued on next page.)



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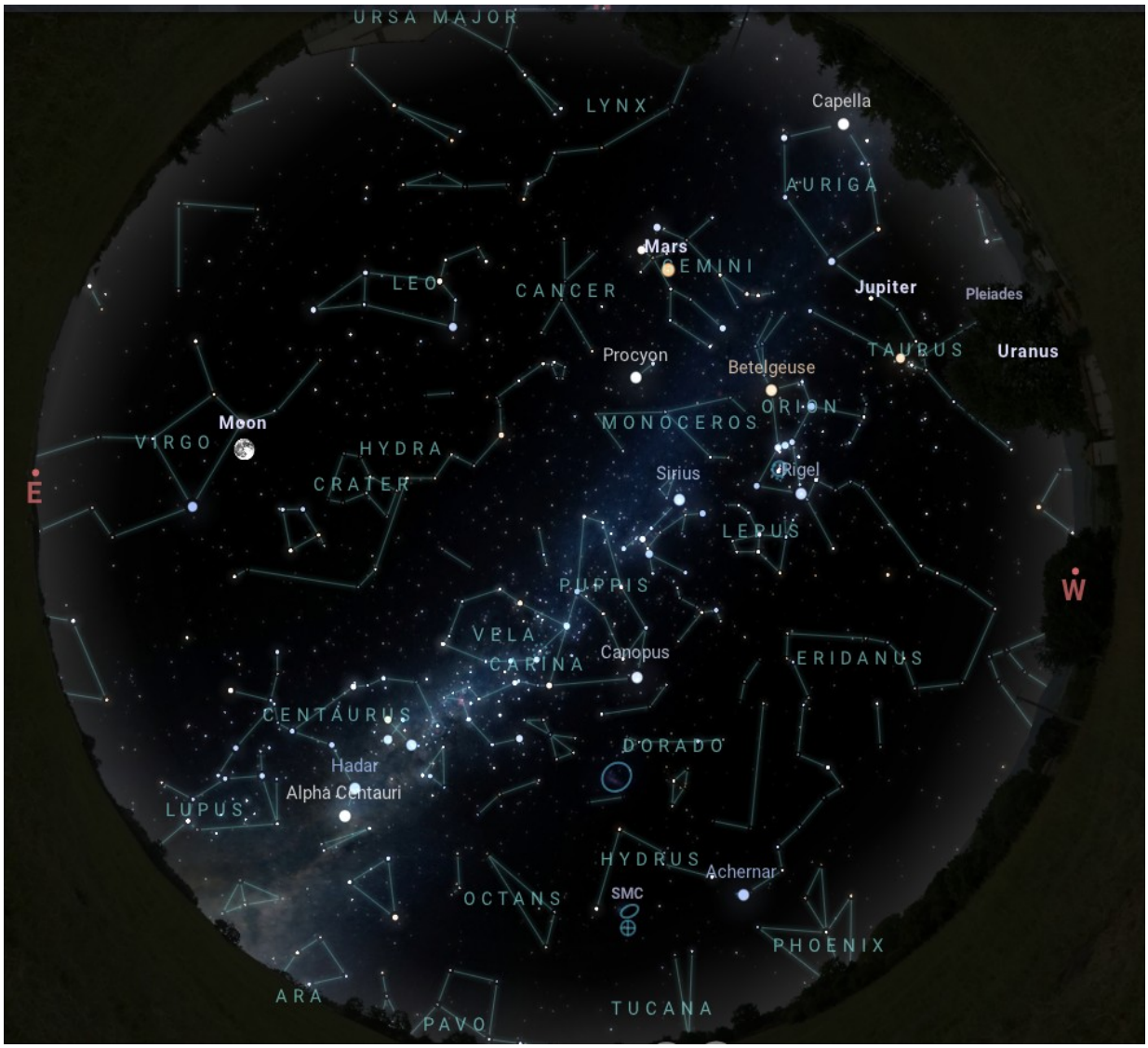
Asteroid 18 Melpomene (the 18th largest asteroid) will be at opposition on the 24th of March, at about 21:00, and will be visible in Virgo at a magnitude 10.1 and the adventurous amonst us can have a go at spotting it!

Constellations:



This image shows the night sky at about 21:00 on the 15th of March and provides some information about the constellations visible during March. The map is available on Stellarium, which now have a very handy online sky map available at https://stellarium-web.org/. Ω

Note about joining our monthly meeting over the Internet

If you wish to attend, please be online before 19h00 SAST (= 17h00 GMT) and mute your microphone until you wish to speak.
Disabling your camera will save bandwidth on your side too.

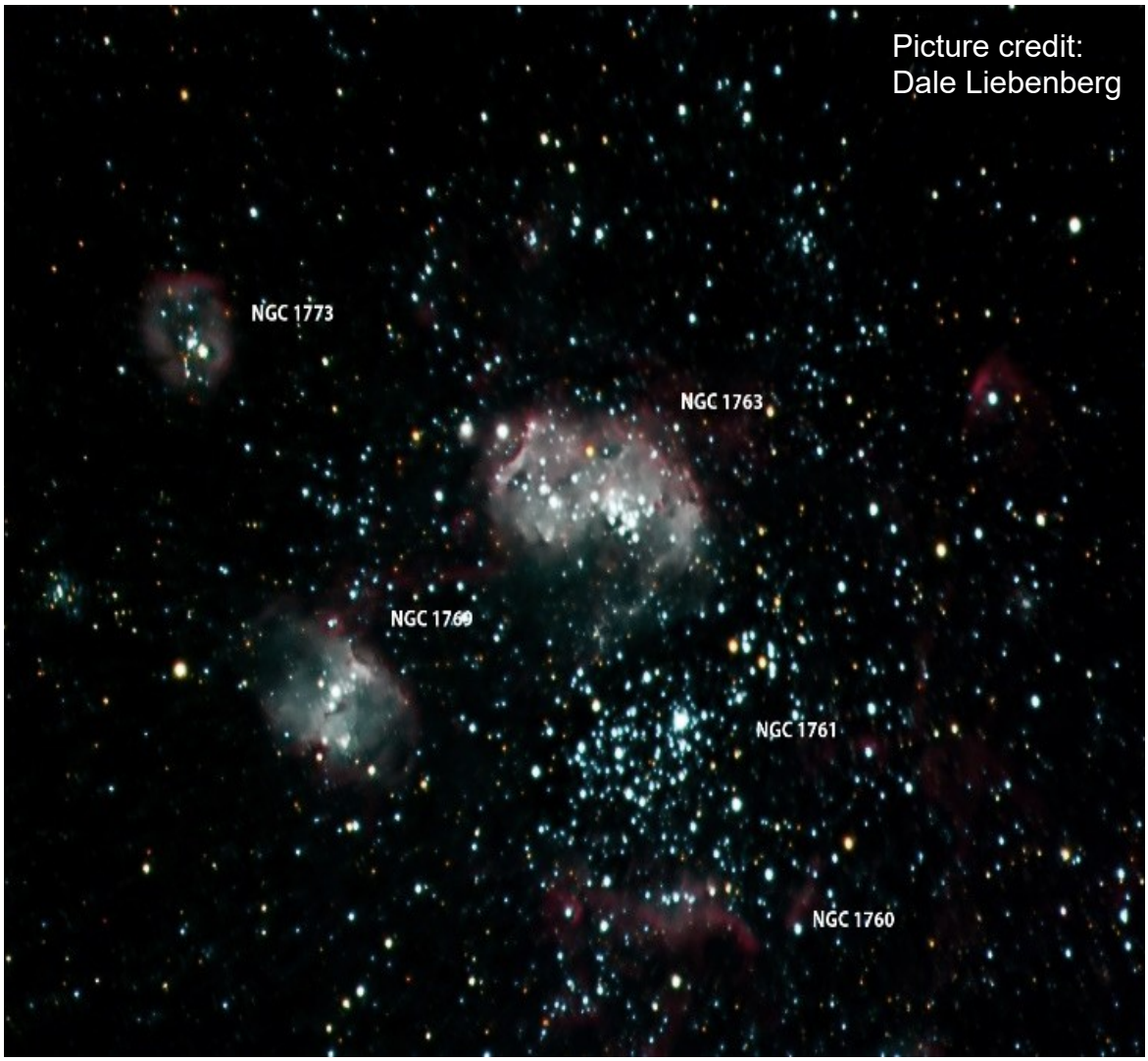
Observing: NGC 1763, a breath of smoke – by Magda Streicher

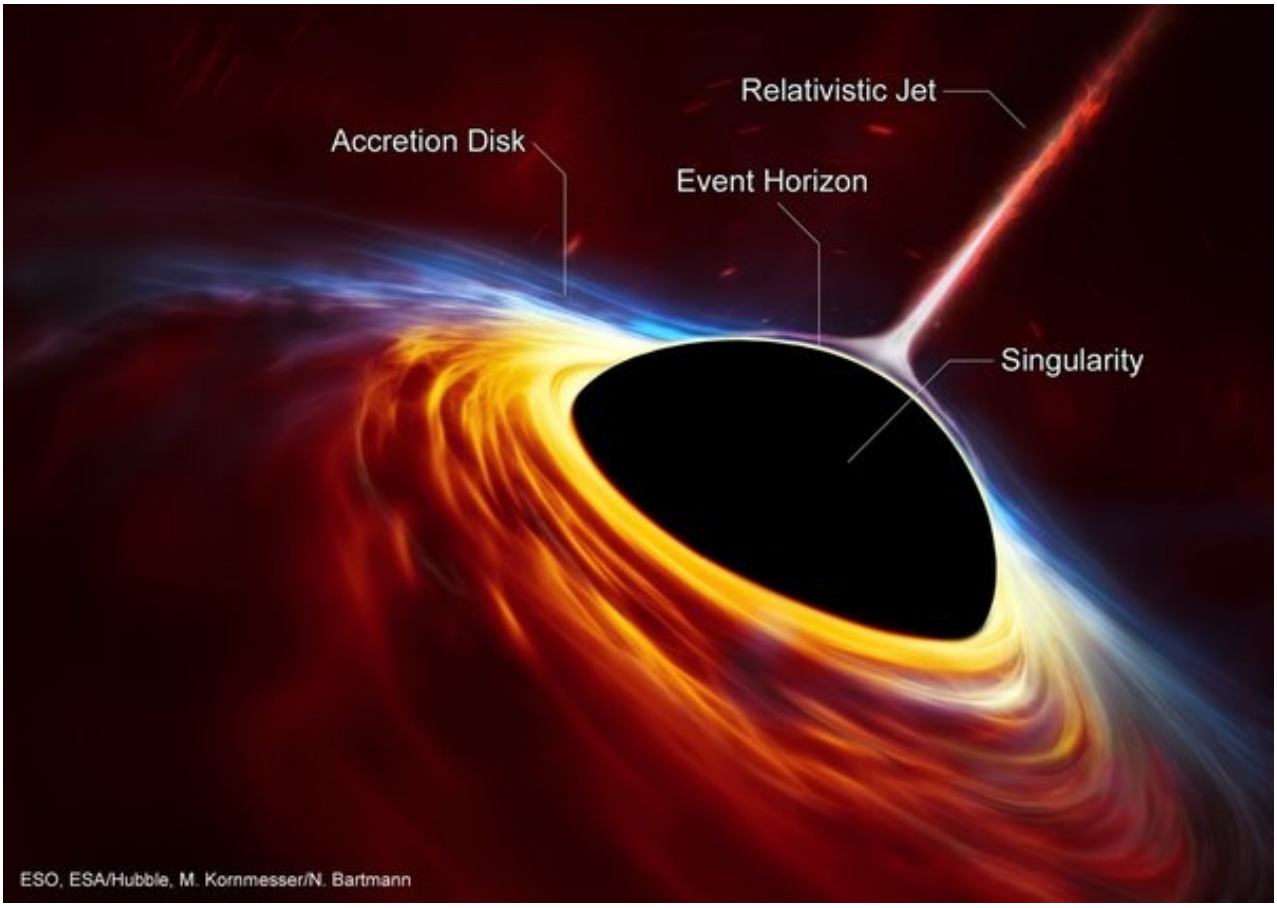
One of the most beautiful areas to explore in this wonderful southern constellation Dorado in the LMC is the lovely gaseous complex around NGC 1763, filled with a breath of smoke and shadow. A few very bright, irregular pieces of nebulosity fill a field of nearly 20' and contain NGC 1760, 1761, 1763, 1769 and 1773.

The focus of this breathtaking complex is NGC 1763 towards the northwest, resembling a cocoon enveloped within a gas cloud, and also the largest with a core rich in starlight. The outstanding star cluster NGC 1761, situated south, spreads over nearly 4'. It is well lifted out and mingles with the emission nebula NGC 1760 further south. NGC 1769, also an emission nebula, is quite obvious and is situated nearly 5' east. It is an uneven hazy nebula with a few stars embedded. Towards the far northeastern part of the complex NGC 1773 shows up as a faint, roundish nebula with a lookalike double star peeking out. Deep pictures however reveal an obvious uneven dark lane from north to south.

Swim around in the muddy waters with Dorado the fish and explore the many stars interspersed with nebulosity. **Ω**

OBJECT	TYPE	RA	DEC	MAG	SIZE
NGC 1763	Nebula / Cluster	04 h 56.8 m	- 66° 24.8'	8	5' x 3'





An artist's depiction of a black hole

Astronomy related images, video clips and documentaries on the Internet

- The Parker Solar Probe is an observatory orbiting the Sun.
Meet the Parker Space Probe: a spacecraft trying to solve the Sun's biggest mystery
- Small asteroid burns up in Earth's atmosphere.
Incredible moment asteroid crashes into Earth's atmosphere
- Images of Jupiter. NASA has captured some stunning updated images of Jupiter
- Running Chicken Nebula. Running Chicken Nebula glows in gorgeous new image from Very Large Telescope in Chile | Space
- Explore the solar system. Exploring the wonders of our solar system
- Winter on Mars. Photos and a video clip.
Mars orbiters witness a 'winter wonderland' on the Red Planet (photos) | Space
- New super digital camera. (Editor's comment: **WOW!!!!**)
World's largest digital camera set to transform astronomy | Watch
- Images of galaxies made by the JWST.
In Photos: 19 stunning spiral galaxies captured by the James Webb Space Telescope
- This image of the great galaxy in constellation Andromeda was hard won. Hubble Space Telescope reveals richest view of Andromeda galaxy to date (image) | Space

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 "2025 SKY GUIDE Southern Africa". Ω**

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