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

NEWSLETTER FEBRUARY 2021

NEXT MEETING

Internet meeting. *

Date and time: Wednesday 24 February 2021 at 19h00.

Programme:

- "The 100 year anniversary of the discovery that the Crab nebula is expanding " by Micael Poll.
- "Observational astronomy " by Percy Jacobs.

Chairman: Bosman Olivier

*** You will receive an e-mail invite from Johan Smit around 18:30 to join the meeting. Please join as quickly as possible.**

NO OBSERVING EVENING THIS MONTH

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Astronomy-related articles on the Internet

A new look at the universe's oldest light | Space | EarthSky New work agrees with previous research suggesting the oldest light in the Universe started its journey toward us 13.77 billion years ago.

New and rare direct image of a brown dwarf | Space | EarthSky

Striped brown dwarf looks a lot like Jupiter | Space | EarthSky

Newly found Comet Leonard might become 2021's brightest | Astronomy Essentials | EarthSky

The myths behind the southern and northern lights | Astronomy Essentials | EarthSky

A new record for the most distant quasar | Space | EarthSky It is a super massive black hole. It is more than 13 billion light-years away, has a mass of 1.6 billion $M_\odot$ and has a luminosity 1000 times that of the Milky Way.

What is the fate of the Earth? | Astronomy Essentials | EarthSky

Theia 456 is a stretched-out stream of sibling stars | Space | EarthSky It has long been known that sibling stars can move together in a star cluster. However, it has now become known that they can also move together in a stream.

Superfast baby magnetar spotted screaming through Milky Way | Live Science

Update on the 7 Earth-sized planets orbiting nearby TRAPPIST-1 | Space | EarthSky
TRAPPIST-1 is a red dwarf star. Three of the seven planets are within the star's habitable zone, in which liquid water can exist on a planet's surface.

Why is there something rather than nothing? | Human World | EarthSky The question asks for a cause. Stated differently, it is: why does the Universe exist? Or: what caused the Universe to come into existence? Of all the great questions, this one is the greatest. All the other great questions actually stem from this one. Read a discussion of it.

Both Hope and Tianwen-1 now orbiting Mars | Human World | EarthSky

1. The United Arab Emirates mission Hope - consisting of an orbiter - arrived at Mars on February 9.
2. The Chinese Tianwen-1 mission - consisting of an orbiter, a lander and a rover - arrived at Mars on February 10.

NASA rover Perseverance survives death-defying plunge, lands safely on Mars | Live Science

3. NASA's Perseverance mission - consisting of an orbiter, a lander and a rover - arrived at Mars on February 18.

July 2020 provided a launch window to the planet Mars, and all three missions launched at that time. That's why all three missions arrived at Mars this month, on one another's heels.

Feature of the month: Wow! signal 2020

The “Wow! signal 1977” was detected only once. It was never fully confirmed and remains unexplained to this day. But now, a new signal has been found, dubbed by some as “Wow! signal 2020”. It was detected by astronomers involved in the Breakthrough Listen project, using the Parkes radio telescope at Parkes Observatory in New South Wales, Australia.

Two things make this detection unique and rather baffling. The first is its properties: the signal is very narrowband, the frequency was originally at 982.002 MHz and has been increasing. The second is that it came from the direction of Proxima Centauri, the closest star to the Sun, only 4.2 light-years away.

Of course, all conceivable terrestrial explanations are considered with great interest by the scientists continuing to study it. So far (25 December 2020), they have not found any. Given past history, it is most likely that a terrestrial explanation will be found. Or will it remain unexplained like the “Wow! signal 1977” ?

Stay tuned for updates on this intriguing discovery. **Ω**

Was this mystery radio signal really from Proxima Centauri? | Space | EarthSky

Astronomy-related images, video clips and documentaries on the Internet

Largest canyon in the solar system revealed in stunning new images | Live Science

10 Places in the Solar System Where Alien Life is Possible – YouTube

10 Mind-Blowing Recent Astronomical Developments – YouTube A documentary about new ideas in astronomy.

Is Earth Being Watched? - YouTube A documentary about SETI.

Something Strange Was Found On Titan – YouTube

10 Unsolved Mysteries of Titan - YouTube

What’s up in March 2021 – by Danie Barnardo

Moon Phases:

See the first image on the next page. During March, the Moon is at perigee (closest to Earth in a specific month) on 2 March 2021 (365,421 km) and again on 30 March (360,310 km). The average distance between Earth and the Moon is 382,500 km. On 18 March, the Moon is at apogee (furthest away from Earth) at 405,252 km. The best time for observing during March is the middle 2 weeks of the month (7 – 20 March 2021). On 21 March the Moon passes near the Beehive Cluster.

Planets:

The second image on the next page shows the rise (solid lines) and set (dashed lines) times of the planets during 2021. In March Jupiter and Saturn are visible, rising after midnight. Mercury is also prominent in the pre-dawn sky and provides excellent visibility of this elusive planet. Mars and Uranus are visible during the early evening. During the month, Jupiter, Saturn, Mercury and the Moon provides some spectacular groupings in the early evening, making for excellent photographic opportunities. Between 1 and 20 March, Mars provides interesting viewing as it passes between the Hyades and the Pleiades in Taurus during the early evening.

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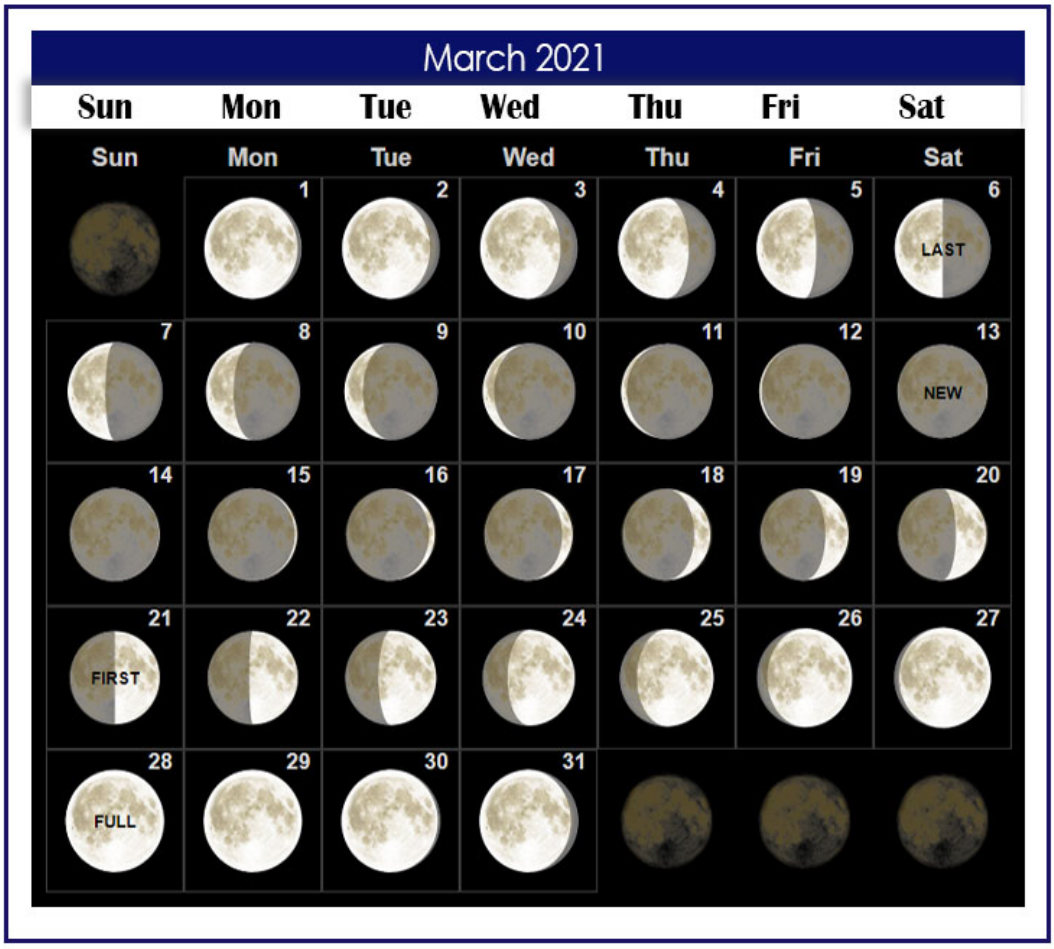
March 2021
Sun Mon Tue Wed Thu Fri Sat
Sun Mon Tue Wed Thu Fri Sat
1
2
3
4
5
6
LAST
7
8
9
10
11
12
13
NEW
14
15
16
17
18
19
20
21
FIRST
22
23
24
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26
27
28
FULL
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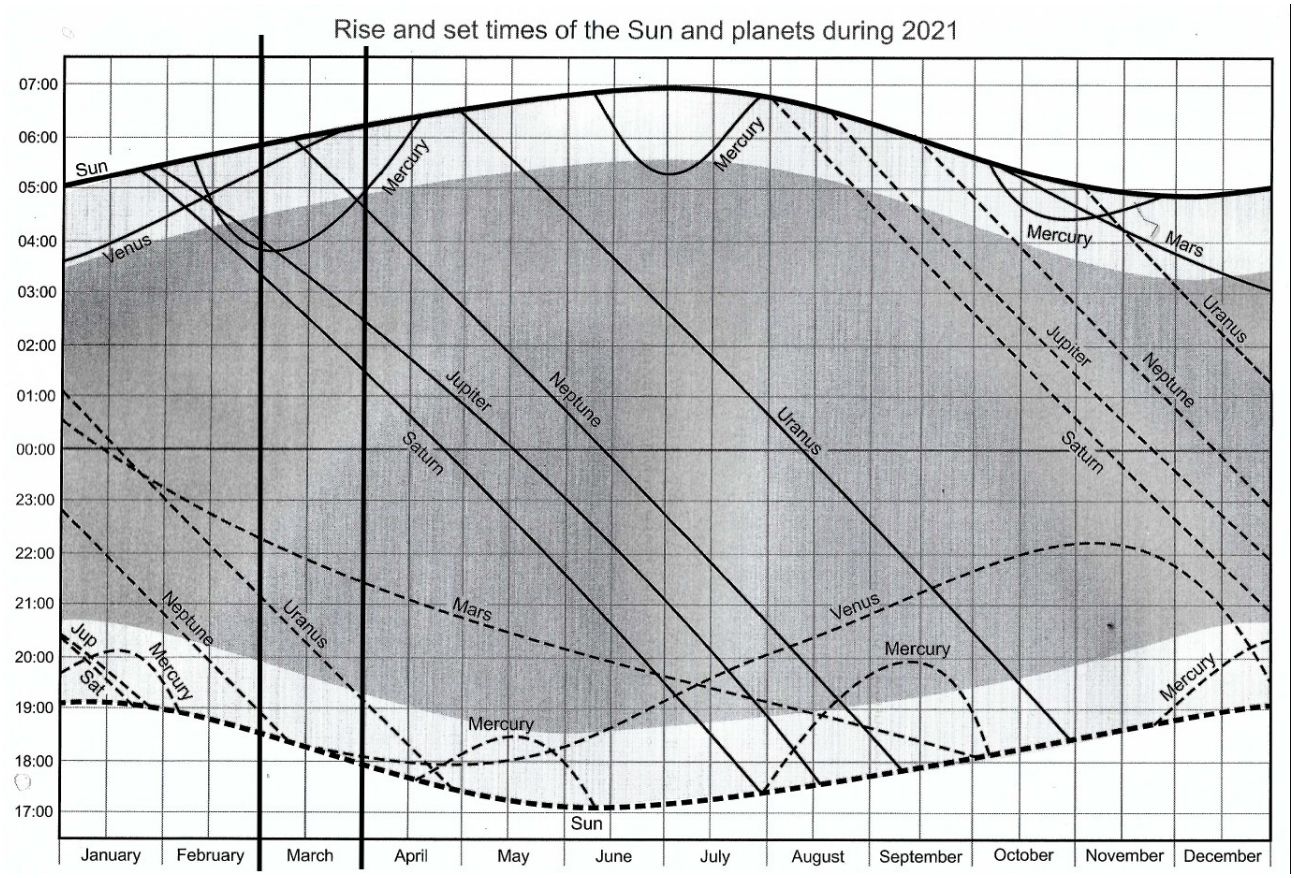
31


Rise and set times of the Sun and planets during 2021
07:00
06:00
05:00
04:00
03:00
02:00
01:00
00:00
23:00
22:00
21:00
20:00
19:00
18:00
17:00
Sun
Venus
Mercury
Jupiter
Saturn
Neptune
Uranus
Mars
Jup
Sat
January
February
March
April
May
June
July
August
September
October
November
December

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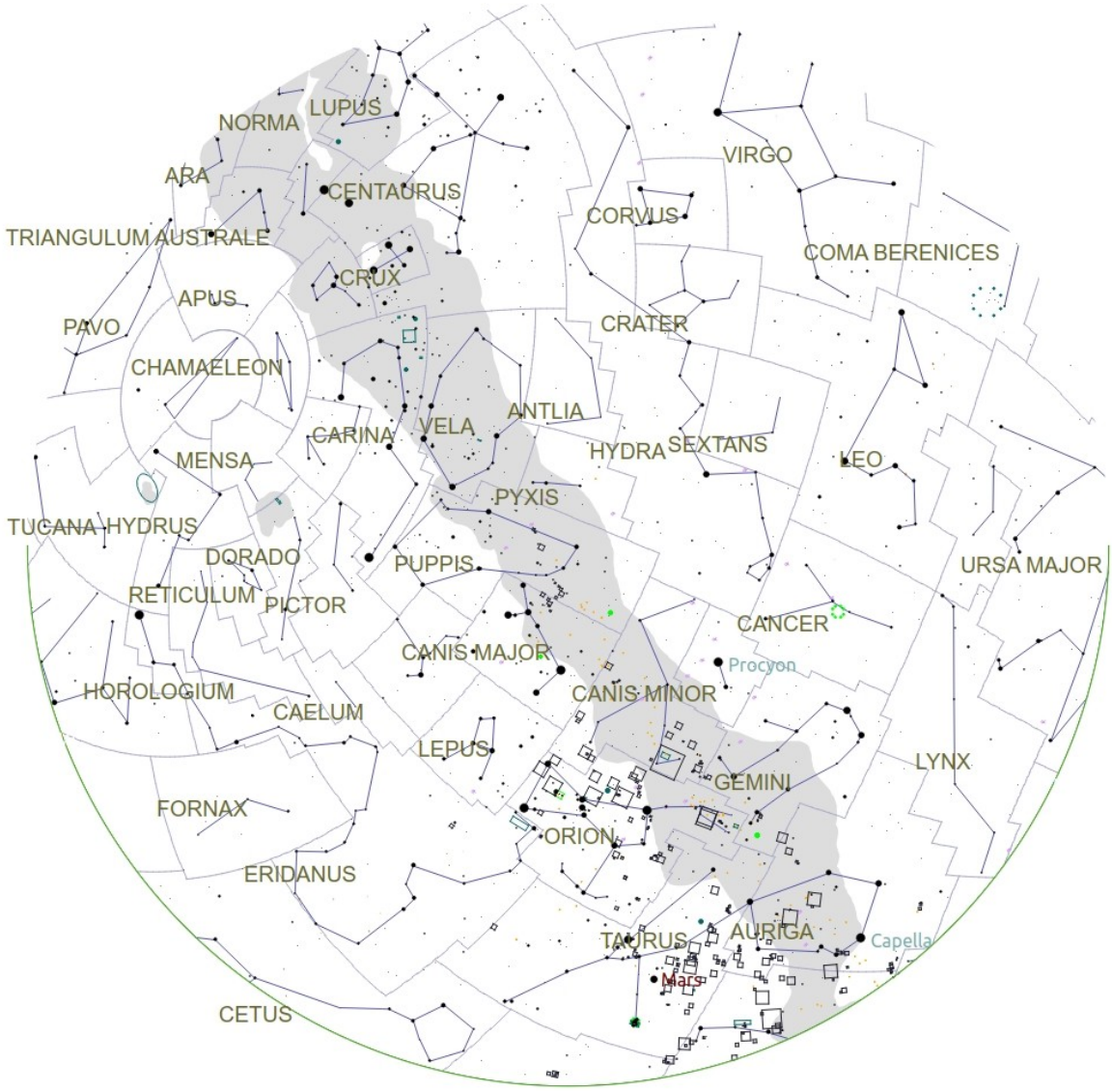
Constellations:



This star chart of the evening sky at about 21:00 on 15 March shows that the Milky Way is prominent during March and is situated at the zenith, providing spectacular views of Crux, Carina, Vela, Puppis and Canis Major with its interesting deep-sky objects. The summer constellations, Orion, Taurus and Gemini, are still visible in the early evening sky.

Interesting stars:

Betelgeuse is the nearest red supergiant star to Earth (distance: 548 light-years). Just over a year ago, around September 2019, Betelgeuse began dimming noticeably. This prominent star in the constellation Orion the Hunter has since regained brightness, dimmed again, and brightened again, apparently now returning to a less active state. Clearly, though, more dimming could happen at any time, so keep watching this star!
This dimming was explained by Hubble observing hot convection cells on the surface of Betelgeuse late in 2019 and a large amount of dense hot gas moved outwards through Betelgeuse's atmosphere.

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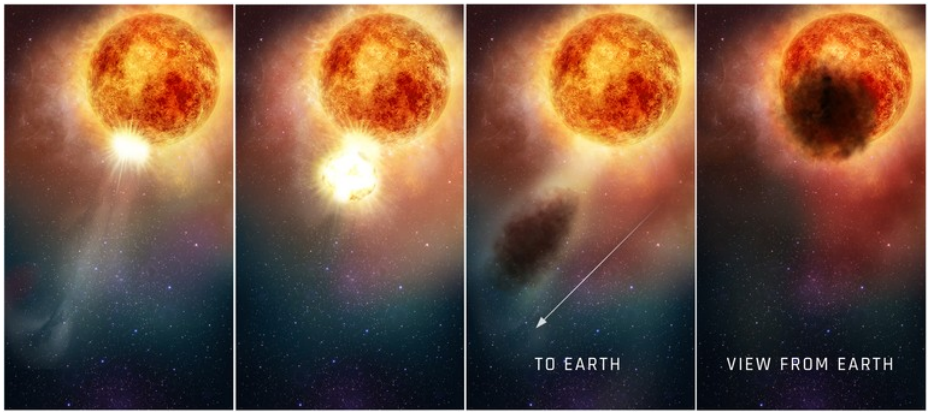
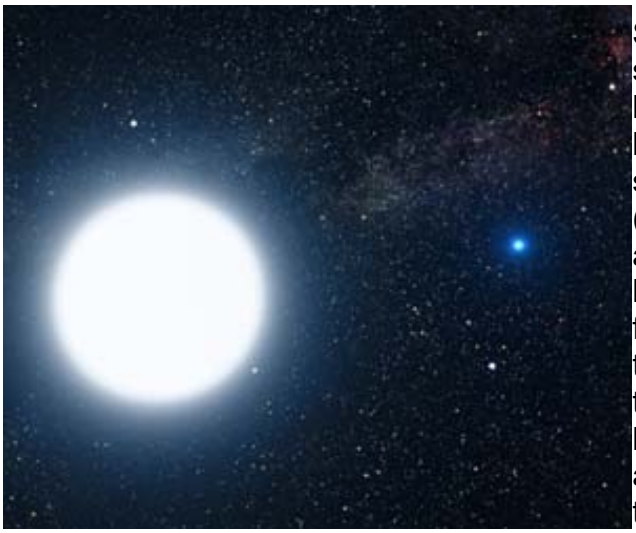
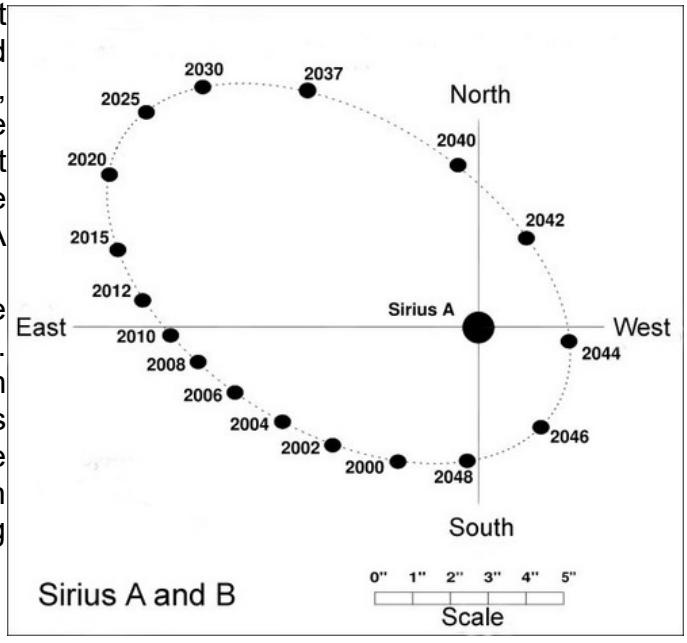
This gas cooled down some distance from the star to form a dark dust cloud that blocked the southern part of the star, causing the dimming.
The image below is an artist's concept showing how Betelgeuse belched a hot bubble of gas that then cooled into a dust cloud and temporarily blocked some of the star's light from Earth's point of view. Image via NASA/ ESA/ E.





Sirius (Alpha Canis Majoris) is the brightest star in the constellation of Canis Major, the hunting dog. At a magnitude of -1.45 it is the brightest star in the sky and is a double star system with a white, main sequence star (Sirius A), also known as the Dog Star and a white dwarf companion (Sirius B), also known as the Pup. It is only 8.6 light years from us. Sirius A has a mass about 1.7 times that of the Sun and has a surface temperature of 10,000 ºC, about twice as hot as the Sun. It is about 25 times as bright as the Sun. Sirius A is so much brighter than Sirius B, that this dwarf companion, which is the core remains of star that has exhausted its fuel supply and shed its outer layers, is not easy to spot, although it is at a comfortable distance from Sirius A. Sirius B is also the nearest white dwarf to the Sun. The image above is an artist's depiction of Sirius A and B.
The diagram on the right shows the elliptic orbit of Sirius B around Sirius A. During 2020 to 2025, a maximum separation between the two companions allow an ideal opportunity to spot the Pup. This is quite a challenge, but can be done. Make it one of your observing challenges for the coming year!



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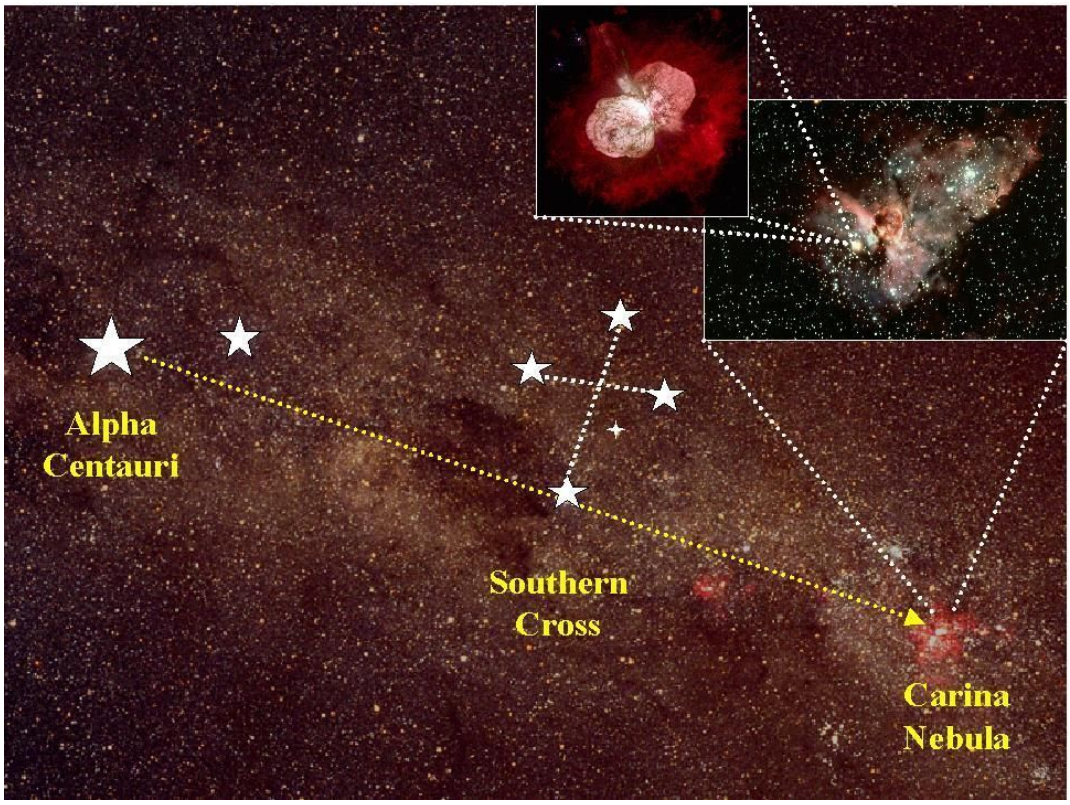
Eta Carinae in the constellation of Carina is estimated to have a mass of 100 $M_{\odot}$ ($M_{\odot}$ = mass of the Sun). Eta Carinae may be one of the most massive stars in our Galaxy. It radiates about five million times more power than our Sun and is 7,500 light years from us. About 150 years ago Eta Carina became one of the brightest stars in our galaxy when it “exploded”, similar to a supernova. However, it survived the explosion and can be seen today as a spectacular object. This diagram shows the locality of Eta Carinae. The two images were recorded by the Hubble Space Telescope.



Gamma Velorum in the constellation of Vela, has a magnitude of +1.7 and a distance of 840 light years. It is traditionally known as Suhail al Muhlif and informally as Regor. The Gamma Velorum system is composed of at least four stars. There are two binaries, Gamma Velorum A and Gamma Velorum B.

Gamma Velorum A consists of a blue supergiant star with a mass of 28.2 $M_{\odot}$ and a Wolf-Rayet star with a mass of 9 $M_{\odot}$. The distance between the two members varies between 0.8 and 1.6 astronomical units and the orbital period is 78 days. A Wolf-Rayet star has reached an advanced stage of evolution at a very young age and is losing mass at a high rate through an extremely strong solar wind. Wolf-Rayet stars are believed to end their lives in Type Ib or Type Ic supernova explosions and therefore this star is one of the nearest supernova candidates to us.

Gamma Velorum B consists of a blue-white giant star with a mass of 14 $M_{\odot}$, and a fainter, much less massive companion. The parameters of the companion are unknown, because it is too near to the blue-white giant.

Since the constellations of Vela, Puppis and Carina originally were part of the ancient constellation of Argo Navis, Gamma Velorum, although being the brightest star in Vela, does not carry the Alpha designation, since the two brightest stars in Argo Navis is now in Carina: Alpha Carinae (Canopus) and Beta Carinae (Miaplacidus). This extremely interesting star is worth scrutinizing!

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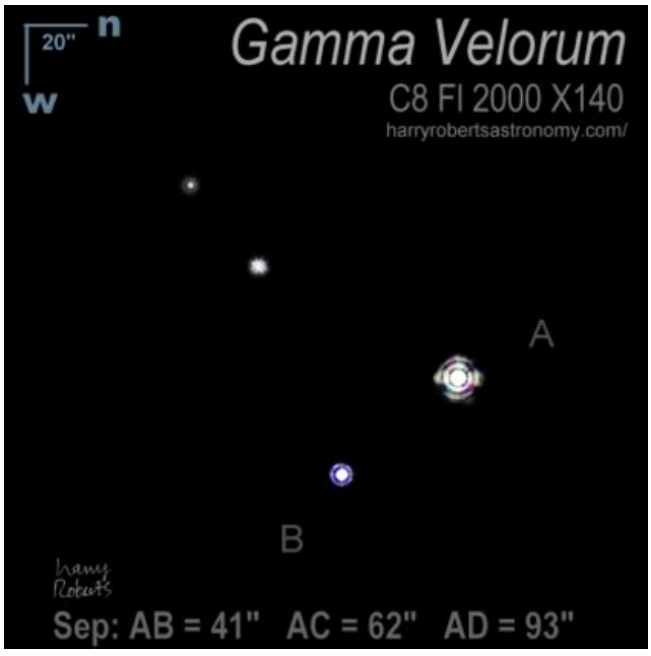
You can find Gamma Velorum (aka Regor) using Canopus and the stars of the False Cross: Alsephina, Markeb, Avior and Aspidiske. A line extended from Aspidiske through Alsephina points in the direction of Regor.

The image below is what you see through a telescope. **Ω**



Observing: Coat hangers in the skies - by Magda Streicher

There are a huge number of star groupings to be found among the billions of stars in the sky, most of whose shapes reflect a story of their own, and it will never become boring to sniff them out for sheer enjoyment.

Such a very special group of stars is known as Collinder 399 – or more commonly, the Coat Hanger Cluster in the constellation Vulpecula. The group is visible with the naked eye, but you definitely have to have a very dark night sky in order to glimpse it. Through binoculars in a full field of view, however, it is easily seen, and a veritable feast for the eye. This is no ordinary coat hanger! For example, the "hook" contains the quadruple star Struve 2521 with a magnitude 6 orange-coloured primary, and two magnitude 10 and one magnitude 11 companion stars.

The Coat Hanger Cluster is one of the oldest clusters on record and there is a debate as to whether this group of ten stars is a real cluster or simply a chance alignment of physically unrelated stars, but the Hipparcos satellite appeared to reveal it as more likely being just a chance alignment of stars.

The group is also referred to as the Brocchi cluster, after Dalmiro Brocchi who mapped it in 1920 and whose map also included the stars 4, 5, and 7 Vulpeculae. In 1931 Swedish astronomer Per Collinder included it in his cluster catalogue as Cr 399.

There seem to be more hangers in the sky than the Coat Hanger Cluster in Vulpecula and the Mini Coat Hanger in the constellation Ursa Minor. Streicher 37 is an asterism with twelve stars of various magnitude that sports the grouping of an old fashioned coat hanger. It is in a north-west to south-east direction with the hook stars pointing south. This small group of stars is situated in a very busy star field and might not be noticed at first. The brightest star in the grouping is SAO 255920.

The Coat Hanger Cluster in constellation Vulpecula

Just about any object can be found within the numerous shapes that star groupings take on. So hang up your fancy clothes on your own coat hangers, get into something comfortable, grab your binoculars and go in search of the exceptional treasures to be found in the starry skies. **Ω**

OBJECT	TYPE	RA	DEC	MAG	SIZE
Collinder 399	Cluster?	19 h 26.0 m	+ 20° 0.0'	5.6	60'
Streicher 37	Asterism	02 h 44.2 m	- 78° 21.8'	10	13'

Astronomy basics: The effect of sunlight on the orbit of an asteroid

Consider sunlight that falls on the surface of an asteroid. Part of the light is absorbed and part of it is reflected. (The greater the albedo of the surface, the greater the fraction that is reflected.) Some of the momentum of the light is transferred to the asteroid. A pressure force is then exerted on the asteroid, termed the solar radiation pressure force. This force acts constantly.

There is another effect that sunlight has on an asteroid. Remember that the absorbed sunlight heats the surface of the asteroid. The heated surface then emits radiation in the infrared (IR) region of the electromagnetic spectrum, causing a radiation pressure force in the opposite direction than that in which it is emitted. And asteroids rotate, like virtually all celestial bodies. (It is a very rare exception if one does not.) As it rotates and its surface emits IR radiation, the heated surface cools down and emits progressively less IR radiation, resulting in a diminishing radiation pressure force. This force is known as the Yarkovsky effect. This force also acts constantly. Learn all about it at:
https://earthsky.org/astronomy-essentials/the-yarkovsky-effect-pushing-asteroids-around-with-sunlight?utm_source=EarthSky+News&utm_campaign=808969daa8-EMAIL_CAMPAIGN_2018_02_02_COPY_01&utm_medium=email&utm_term=0_c643945d79-808969daa8-394671529

These two forces are small in comparison with the force of gravity on an asteroid. However, over a long period of time, these constantly acting forces can cause a considerable perturbation of its orbit.

These two forces on large near-Earth asteroid 99942 Apophis are worrisome. The asteroid has a diameter of between 340 and 370 meters. On December 21, 2004, Apophis passed 0.0963 AU (36 times the distance of the moon) from Earth. It is expected to pass close to Earth again in 2029, 2036 and in 2068. See:
https://earthsky.org/space/asteroid-99942-apophis-encounters-2029-2036-2068 **Ω**

NOTICE BOARD

Astronomy on your PC. Classify the light curves of variable stars and help to find the most unusual ones. Citizen ASAS-SN — Zooniverse

Launch date of the JWST. The newest launch date is 31 October 2021.

KAROO STAR PARTY 2021. After the disappointment of the 2020 event due to the Corona-virus lockdown, the Pretoria Centre of the ASSA is continuing the annual National Karoo Star Party which was started by Danie Barnardo in 2009 at the Kambro Padstal, about 20 km north of Britstown in the Karoo, next to the N12 National Road. This event is intended to be a get-together for friends who want to enjoy the beautiful Karoo sky. There are no scheduled events, talks or workshops – we go there simply to enjoy the company of fellow stargazers and the legendary Karoo sky. The 2021 Star Party is scheduled for Wednesday 12 May to Sunday 16 May 2021.
Please book early to avoid disappointment! There is also accommodation available in Britstown at the Karoo Country Inn.
See http://www.kambroaccom.co.za or phone Wilma Strauss at 083 305 6668 for details of the site and to make a booking.

Celebrations. 23 March is World Meteorological Day and on 28 March Earth Hour is celebrated, when people the world over are encouraged to switch off their lights between 20:30 and 21:30.

Beanies. Beanies will be offered for sale @ R40.00 each at every monthly meeting, until they are sold out.

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.

Data base. Members are reminded that a data base of the books in our library is to be found on our website.

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 "2021 Sky Guide Africa South". Ω**

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