

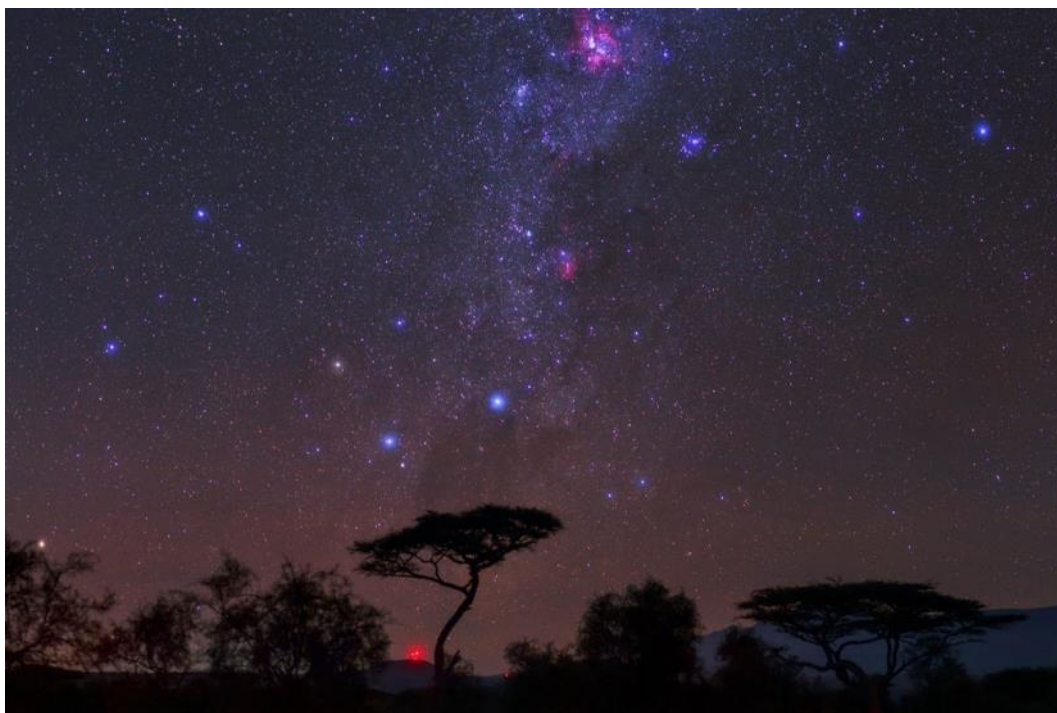


ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

Durban 'nDaba

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Chairman's Chatter

Dear Members and Astronomy Friends,

Since the vernal equinox on 20 March, we are officially in Autumn and we have more night-time than daytime hours in a day. Let us hope this helps for better viewing opportunities and give our growing number of photographers the time to capture beautiful images.

Our South African astronomy enthusiasts continue to amaze us.

A local daily news paper recently reported on the record attempt by "rocket scientists" from our very own UKZN. This is covered in some detail in this issue of the n'Daba. We will invite them to do a presentation for us at a general meeting.



Clyde Foster, an ASSA member in Pretoria has done some incredible work with planetary photography. As a "non-professional" astronomer, he has earned many accolades not least is to have a spot near the big red spot on Jupiter, named after him. "Clyde's spot" has featured in many publications. A recent scientific article was published, acknowledging Clyde as a co-author. The article can be found on the link: Jupiter's Great Red Spot feeds on smaller storms - AGU Newsroom for a short period. If you would prefer a copy, please let me know by email.

Clyde has a standing invitation to visit us in Durban and we hope we can hear more from him soon.

I did refer to the achievements of Dr Japie van Zyl in the March Chatter. NASA was initially quiet about the contributions he has made to their planetary exploration. He played a big part in the recent Mars expedition and the use of the helicopter was his brainchild. He has now been (posthumously) honoured by NASA naming by naming the location where the Ingenuity Mars Helicopter will attempt its powered controlled flight "Van Zyl Overlook".

<https://www.jpl.nasa.gov/images/van-zyl-overlook>



Our next meeting will be on 14 April when we will have Dr Matt Hilton from UKZN as a guest speaker. He will talk about stellar evolution and the Gaia mission. Matt has given us several interesting talks and we look forward to this.

Although some of the Covid restrictions are being relaxed, we will continue to have our meetings via Zoom. The details of the meeting will be sent to you shortly.

See you on Zoom.

Piet Strauss

Astronomy Delights

Libra - Balance Your View Through Libra



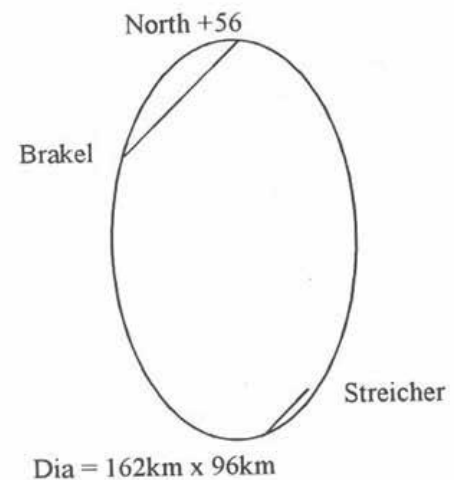
When the constellation Libra pops its scale up above the eastern horizon, it also brings the importance of balance to the fore. Balance has relevance to many things, not only for us as people, but also, and especially, to astronomy. Is our inclination not frequently to seek out only the bright deep sky objects, whether with a telescope, binoculars or the naked eye, while so many of the fainter objects are pushed aside? And this is where, when a balance is maintained, we can be surprised by the results.

Libra is located just north of the better-known constellation Scorpius. The stars currently making up the constellation were first characterised by Eratosthenes as the pinchers or claws of the Scorpius shape constellation.

About 4000 years ago the sun resided in Libra at the northern autumn equinox, when day and night have equal lengths and are in balance. Over time (due to the wobble of earth's axis under the gravity influence of the sun) its autumn equinox resides now in the constellation Virgo.

Virgo was a goddess known as Astraea who held the scales of Justice, which explains the association with the Scale indicated by the constellation Libra. Quite coincidentally, and aptly, on 22 May 2000 a message was received announcing the shadow track of an occultation of the magnitude 9.4-star Hipparcos 75185 by the minor planet (5) Astraea in the constellation of Libra. It was expected to cover Polokwane, the town in which I live, after crossing the Australian mainland and the Indian Ocean. The star is situated only a degree east of beta Librae. Albert Brakel and myself were advised by the RASNZ Occultation Section that

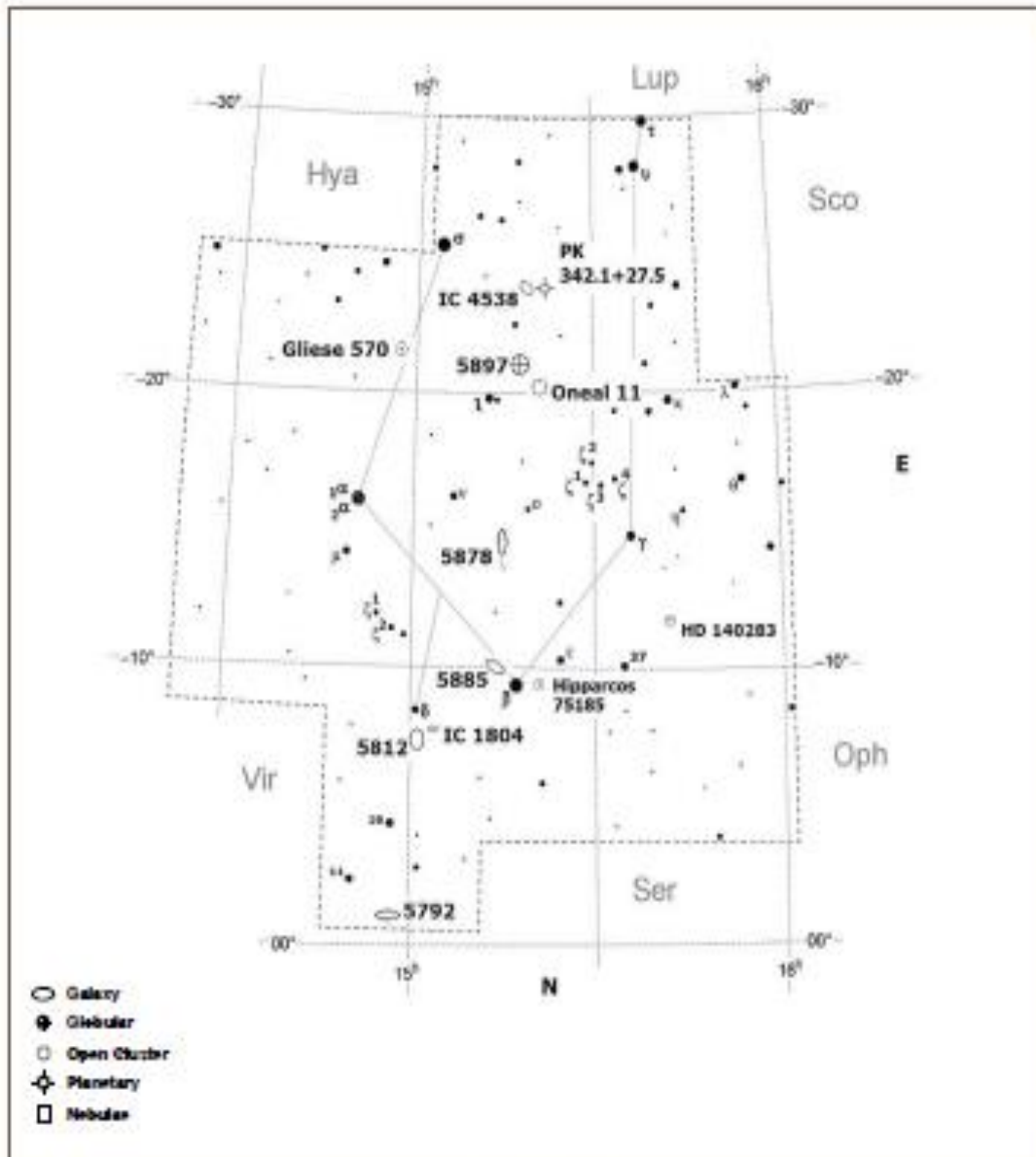
2000 May 22 – Astraea



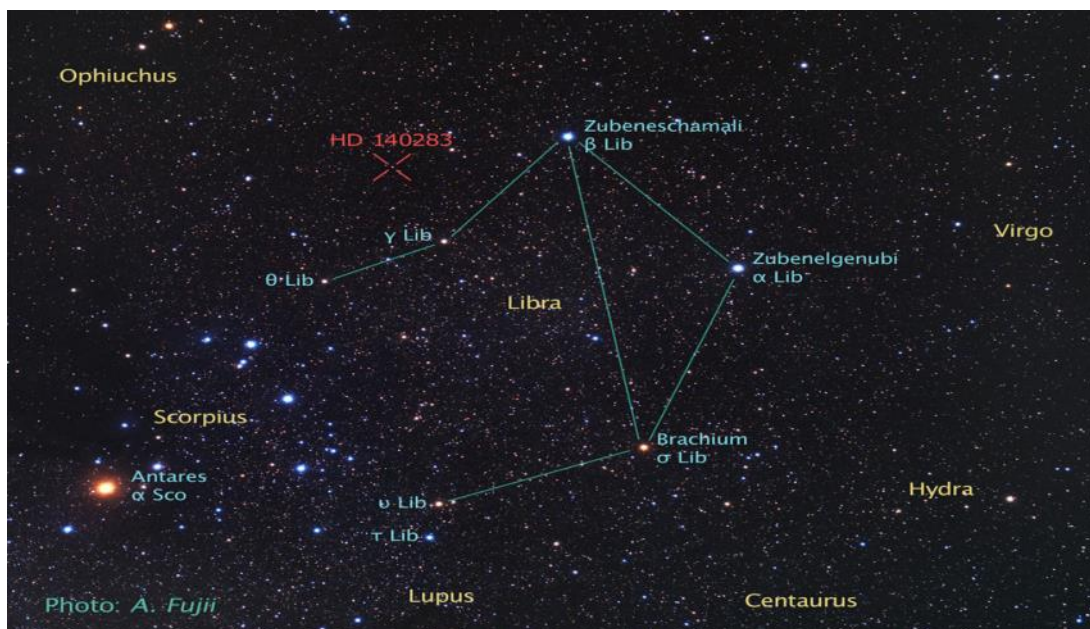
we had been successful in our observation of the occultation in defining the major dimension of (5) Astraea at 162km by 96km in size. The late Danie Overbeek (then the occultation director) was very excited and sent Brakel and me a note of appreciation (see occultation illustration – RASNZ).

The two famous stars alpha and beta Librae, probably have the strangest nicknames of all the stars in the sky: Zubeneigenubi, alpha (the southern claw), and even more worse, Zebeneschamali, beta (the northern claw).

...Balance Your View



The constellation of Libra



...Balance Your View

The magnitude 2.7 alpha is also a double star, shining with a pale-yellow primary and a light grey companion, with a separation of 60" and visible with the naked eye in very dark starry skies. The brighter beta Librae, with a magnitude of 2.5, is sometimes referred to as the pale emerald star.



Searching for the planetary nebula **PK 342.1+27.5**, known more popularly known as Me 2-1 is perhaps easier to locate the galaxy **IC 4538** in the far southern part of the constellation. No easy task, this galaxy is extremely faint, but averted vision will bring to the fore at least an oval haze. But then when success is achieved, PK 342.1+27.5 is situated only 15' towards the east of the galaxy. The planetary, which is about 15 000 light-years away, is also the close neighbour of the magnitude 9.8-star SAO 183407, only an arc-minute towards the west. The planetary nebula appears as a faint dot, barely seen,

which disappears with direct vision, but averted vision shows an out-of-focus star with a soft edge. Perhaps a nebular filter would help one spot it and make the task slightly easier. If it had not been for the blinking effect, I would not easily have seen it. Higher magnification reveals a really soft, round planet Uranus impression with a light blue colour and smooth disc. The hot central magnitude 16 star could not be seen. Sometimes it requires careful observation and a lot of time and patience to spot special objects like this one.

It was discovered by Paul Willard Merrill (1887–1961) in 1942. He was an American astronomer whose specialty was spectroscopy, and was the first to define Type-S stars in 1922. He spent the bulk of his career at Mount Wilson Observatory, from which he retired in 1952.



Paul W. Merrill



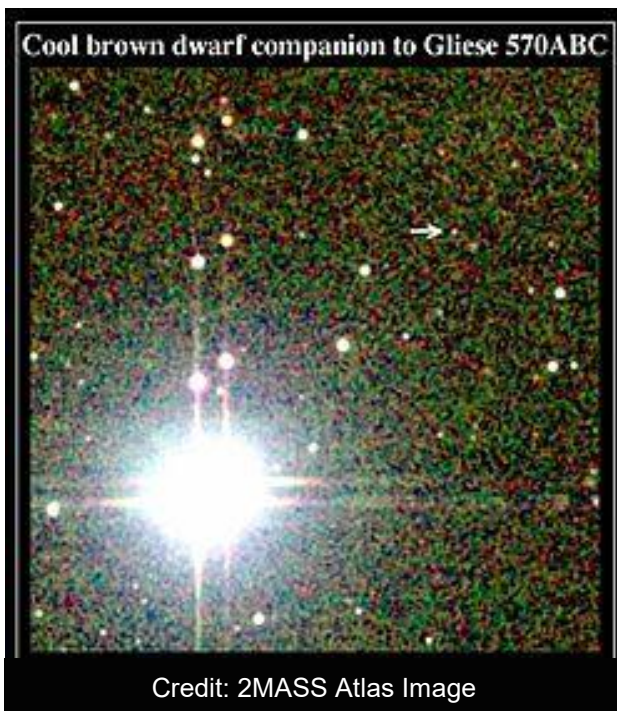
Approximately 1.5 degrees south of the double star iota Librae with a magnitude 4.5 and magnitude 6, one of the giant globular clusters found its home. The globular cluster **NGC 5897** displays a hazy, perhaps slightly oval glow with a fringed edge. NGC 5897 is not very condensed, gradually getting brighter towards the core. Careful observation reveals a sandpaper texture. It could also be seen as a loose heap of very faint stars mingling in haziness. With higher magnification, however, the very faint stars just seem to multiply, revealing a milky, blazing core blending together. The north-western edge comprises a few brighter stars, together with faint stars spreading out, which most probably gives it the slightly elongated impression.

...Balance Your View

Try to spot this globular cluster with binoculars when you next experience favorable dark skies. In April 1784, William Herschel was sweeping with his 18-inch speculum telescope and recorded this globular cluster as a compressed cluster of stars, 8' in size, extremely rich, of an irregular round figure a little extended. Further he adds that the stars are so small as to be hardly visible and so accumulated in the middle as to look nebulous.



NGC 5897 – Photograph: Dale Liebenberg



Credit: 2MASS Atlas Image

Gliese 570 is a multiple star system approximately 19 light-years from the sun towards the southwestern part of the constellation. It consists of a 5.8 magnitude primary orange dwarf star (A) with a close binary magnitude 8.2 (B and C), two red dwarf stars orbiting A at a distance of 190 AU with a period of about 2130 years. The angular separation is 25.6" at a position angle (PA) of 305°. In 2000 a brown dwarf was found orbiting the system at a distance of more than 1500 AU and at the time it was the coolest brown dwarf yet discovered with a surface temperature of only 500° Celsius. The WDS lists other distant components D, E, F and G, which may be part of this system.

Asterisms are the beauties of the starry skies, just search them out. Not only is it fun but it will be more than rewarding; and on top credited by the Deep Sky Hunters forum if satisfied with the indicated criteria. Michael O'Neal, is one of the most active amateurs in the USA. **ONEAL 11**, is situated 2.7 degrees east of NGC 5897 and one of the faintest but truly specular star strings, daintily situated in an east-west direction. Seven varied magnitude stars between 11 and 13 with a pair of magnitude 11.8 stars ended of the string towards the east end, one a pure white and the other a yellow colour.



RIGHT: Michael O'Neal with his 16-inch Newtonian

...Balance Your View

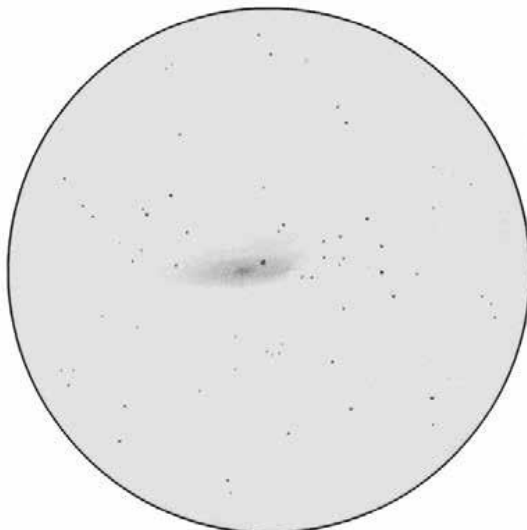
NGC 5878 is an edge-on galaxy in the true sense, three times as long as it is wide and situated more or less halfway in line with alpha and the magnitude 3.9 gamma Librae. The galaxy is just south of two relatively bright stars and elongated in a north-south direction. The one thing outstanding is the small bright stellar nucleus. A nice V-shaped asterism is situated 30' towards the west of the galaxy.



A special galaxy, **NGC 5885**, is situated 2.6 degrees south-west of beta Librae. The galaxy is not very bright, but shines with a uniformly oval glow in a north-east to south-west direction. With really high power, very dark skies and patience a vague spiral structure can be glimpsed slightly towards the southern part. There is a slight brightening towards the inner north-eastern part of the galaxy which deep pictures show as a distorted arm. A magnitude 10 star plus a few faint companion stars pair together on the north-eastern rim. Large observatory telescopes show an inner ring.

Another lovely star in the constellation is gamma Librae, forming a long triangle north-east with alpha and beta Librae. This magnitude 4.9 eclipsing binary system consists of two stars orbiting each other every 2.3 days. The cooler, fainter one passes in front of the brighter companion, which experiences a 60 percent drop in brightness. It takes only an equal six hours to fall and rise in brightness and it is possible to trace this in one night of observation.

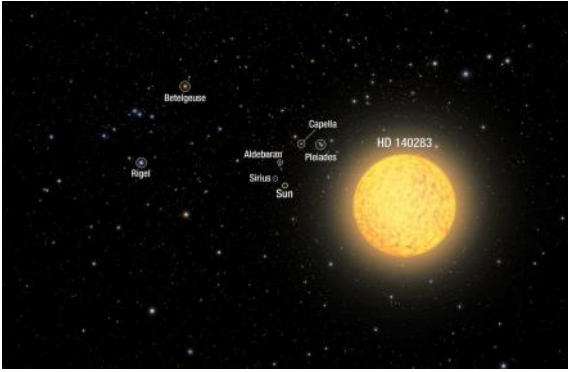
Only a degree north from delta Librae is a pair of galaxies quite different from each other. The brighter of the two, **NGC 5812**, is a typical elliptical galaxy, a fairly bright circular halo, well defined, with a stellar nucleus. The companion, **IC 1084**, is definitely a hide-away that is not easily seen. Real deep sky pictures, however, show a very small east-west spiral, a quarter the size of NGC 5812.



NGC 5792 – Galaxy

An introduction to another galaxy on the northern border with Virgo is **NGC 5792**, a typical barred spiral galaxy, slightly elongated in an east-west direction. A magnitude 9.5 red-orange star embedded towards the north-western part of the galaxy created a double nucleus. Although with averted vision, the galaxy is clearly separated from the star. On closer investigation the stellar nucleus appears to have a hazy envelope. Higher magnification and very dark skies reveal the northern edge slightly more defined with small dark knots on the surface. Try to avoid the star by ignoring it and concentrating on the galaxy for faint detail.

...Balance Your View



One of the oldest stars known in our Milky Way is HD 140283, a lovely buttery coloured magnitude 7.2 star only 190 light-years away from us. Find the star south-east of beta, 2 degrees from the star 37 Librae. According to a study it is low in heavy elements suggesting its age to be about 14.5 billion years old.

Balancing your life is not always easy, but do try weighing the objects of the less well-known constellations against those of the better-known ones and find a balance that will make observation worthwhile again and again.

| OBJECT | TYPE | RA | DEC | MAG | SIZE |
|-----------------------------|----------------------|----------|-----------|------------|----------------------|
| Gliese 570 A B C D E F G | Multiple Star System | 14h57m.5 | -21°25'.0 | 5.8 8.2 | Sep 25.6" PA 305° |
| NGC 5792 | Galaxy | 14h58m.4 | -01°05'.0 | 11.2 | 7.3'×1.9' |
| NGC 5812 | Galaxy | 15h01m.0 | -07°27'.1 | 11.2 | 2.3'×1.9' |
| IC 1084 | Galaxy | 15h01m.3 | -07°28'.6 | 14.7 | 0.6'×0.4' |
| NGC 5878 | Galaxy | 15h13m.7 | -14°16'.7 | 12 | 3.5'×1.4' |
| NGC 5885 | Galaxy | 15h15m.1 | -10°05'.1 | 11.8 | 3.2'×2.6' |
| NGC 5897 | Globular Cluster | 15h17m.4 | -21°00'.6 | 8.6 | 2.6' |
| IC 4538 | Galaxy | 15h21m.4 | -23°39'.5 | 12.7 | 2.6'×2.0' |
| PK 342.1+27.5 | Planetary Nebula | 15h22m.3 | -23°37'.5 | 11.6 | 6" |
| ONEAL 11 | Asterism | 15h28m.9 | -20°21'.6 | 10 | 5' |



Galaxies in Libra: NGC 5917 (top) and PGC 54817 – Photograph: Dale Liebenberg

At the Eyepiece

April 2021 by Ray Field



The Moon is Last Quarter on the 4th, New on the 12th, First quarter on the 20th and full on the 27th. The Moon is near the following bright planets and stars as follows: Antares on the 1st, Saturn on the 6th, Jupiter on the 7th, Mercury on the 11th, Venus on the 12th, Aldebaran on the 16th, Mars on the 17th, Pollux on the 19th, the Beehive Cluster (M 44) on the 20th, Regulus on the 22nd, Spica on the 26th, Beta Scorpii (occultation) on the 28th and Antares on the 29th. For more details of the Beta Scorpii occultation see pages 20 and 67 of the Sky Guide 2021.

Mercury may be seen in the morning sky before dawn in the eastern twilight at the start of the month, until it reaches superior conjunction on the far side of the Sun on the 19th when it can't be seen. It will re-appear in the evening sky in May, low over the West.

Venus is too close to the Sun to be seen this month..

Mars is in the evening sky this month and passes through Gemini near the open cluster M35 between the 26th and 27th. Mars has distinct orange-red colour and looks like a fairly bright star to the naked eye. Mars is near the Moon on the 17th.

Jupiter can be seen in the pre-dawn sky this month. It is close to Saturn. On page 21 of the Sky Guide 2021 are excellent diagrams of the planets, Jupiter, Saturn and Mercury in and below the "V" of Capricornus. Jupiter being a bright object should make it easier to see this planetary alignment. The Moon is near Saturn on the 6th and Jupiter on the 7th.

The faint planet Uranus is not well placed for observation in the constellation of Aires this month and reaches conjunction with the Sun on the 30th April.

Meteor Showers: There are 3 showers observable in April 2021 on page 86 of the Sky Guide 2021.

| Duration | Name | Peak | Dec of Radiant | Z H R | From | Prospects |
|-----------------|----------------|----------|----------------|-------|---------------|-------------|
| 11 Mar – 16 Apr | Delta Pavonids | 6 April | - 63° | 5 | 02:00 – 04:30 | Poor |
| 16 Apr – 25 Apr | April Lyrids | 22 April | + 34° | 15 | 02:00 – 05:00 | Good |
| 15 Apr – 28 Apr | Pi Puppids | 23 April | - 45° | <5 | 19:00 – 23:00 | Unfavorable |

The Starry Sky. From Durban in the early, the Southern Cross and pointers are quite high over the South East already and the bright star Achenar is getting very low over the South West. Scorpio is rising in the east and Orion is setting in the West. The bright band of the Milky Way in the "Three Crosses" area is still well placed and the bright star Canopus over the South West is still high. The brightest star in the night sky "Sirius" is to the East of Orion's belt. Above due North, is the "Sickle" of Leo, the lion, containing Regulus, a bright blue-white star 26th in brightness in the sky. Above the North East, Spica, the bright, blue-white alpha star of Virgo is rising. Below Sirius looking North is the eighth brightest star in the night sky. Procyon, and below it are the two brightest stars in Gemini, namely Pollux and Castor.

References include: ASSA Sky Guide Africa South 2021, Norton's Star Atlas, Philips Planisphere for 35° S and Stars of the Southern Sky by Mary Fitz Gerald.

A Brief Tour of Aquarius

By Brian Ventrudo



The Helix Nebula is a planetary nebula, a cloud of glowing gas ejected by a dying mid-sized star (image by John Gill)

Aquarius is a dim constellation in a barren patch of sky far off the plane of the Milky Way. Just east of Capricorn, it marks the 11th constellation of the zodiac. This dim constellation lies near the other “watery” constellations including Cetus, the Sea Monster (or whale), Pisces, the Fishes, and Eridanus, the River. This ancient constellation was associated with water or water bearers since Babylonian times. Some representations have the water bearer pouring water into a stream that leads to the bright star Fomalhaut, the mouth of the southern fishes Piscis Austrinus. Like Capricorn, Aquarius has far fewer deep-sky sights than Sagittarius. But there are a handful of objects here of enduring interest including the famous Helix Nebula, one of the nearest planetary nebulae to Earth. Let’s take a short tour of some of the finer sights in this zodiacal constellation...

Messier 2 – A Bright Globular Cluster

The globular cluster M2 is the finest Messier object in Aquarius and a near-twin of the splendid globular M15 in Pegasus, to the north. The cluster was cataloged by Charles Messier in 1760 as he searched for a comet in the area, though it was observed earlier by other French astronomers.

M2 has about the same brightness as M15 and it lies at the same distance, about 33,000 light years. But the core of M2 is less condensed and easier to resolve in larger backyard telescopes.

In a 4-inch scope at 30-40x, 6th-magnitude M2 is a dim, fuzzy ball. Increase magnification to 150-200x, and you’ll begin to resolve stars in the halo of the cluster. M2 also reveals a somewhat north-south oval shape at higher magnification under steady gaze. An 8-inch or larger scope fully resolves the halo and some stars towards the core.

...A Brief Tour of Aquarius

M2 lies about 13° south of M15 in Pegasus and makes a nearly right-angle with alpha and beta Aquarii, also known as Sadalmelik and Sadalsuud. To find the cluster, locate the star epsilon Pegasi (Enif), the nose of the winged horse and the 4th-magnitude star alpha Equulei (Kitalpha) 5° to the southwest. From the halfway point between the two, look another 5° to the southeast to find three 6th-magnitude stars. South of those, you will see a string of stars that become increasingly bright to the southwest and lead directly to M2.



ABOVE: The globular cluster Messier 2 as it might appear in a small telescope.
Credit: Pepe Manteca/Flickr.com

Messier 72 & 73 – A Globular Cluster... and a Mistake!

Just north of Capricorn and over the border of Aquarius lies three deep-sky sights in a patch of sky just 3° wide. Let's start with M72, the faintest globular cluster on Messier's famed list. The cluster is a distant 55,000 light years away, which partly accounts for its low brightness of magnitude 9.3. The stars are hard to resolve in a telescope with objectives less than 8-inches in diameter. Although a 4-inch scope at high magnification may reveal some granularity in the halo. The core appears somewhat diamond-shaped in a small scope.

M72 is a fairly open globular cluster much like the more impressive and somewhat brighter and closer M71 in Sagitta. Look for M72 about 3.3° south-southeast of the 4th magnitude star ϵ (epsilon) Aquarii, less than a degree west of a 6th-magnitude orange star.

Now to a star cluster that's not really a cluster at all, but rather a random alignment of four unrelated stars which Charles Messier mistook for a cluster. This is M73 and it's located about 1.3° east of M72. M73 consists of just four stars of 10th and 11th magnitude in a tiny Y-shaped asterism about 1 arc-minute across. Use 100x to darken the background sky and bring out the best view of this tiny group. It looks like a stubby little rocket ship lost amidst a desert of background stars.



ABOVE: The asterism Messier 73 in the constellation Aquarius. Credit: NOAO / AURA / NSF/ REU program.

...A Brief Tour of Aquarius

NGC 7009 – A Planetary Nebula

Two degrees northeast of M73 lies the small but fairly bright planetary nebula NGC 7009. At low power, it looks like a slightly swollen 8th-magnitude star. At 100x, the nebula appears as a pale green glow with a 12th-magnitude central star visible in even a 3-inch scope. A nebula filter will make the star disappear, but it may also reveal some detail, including a barely perceptible inner shell.

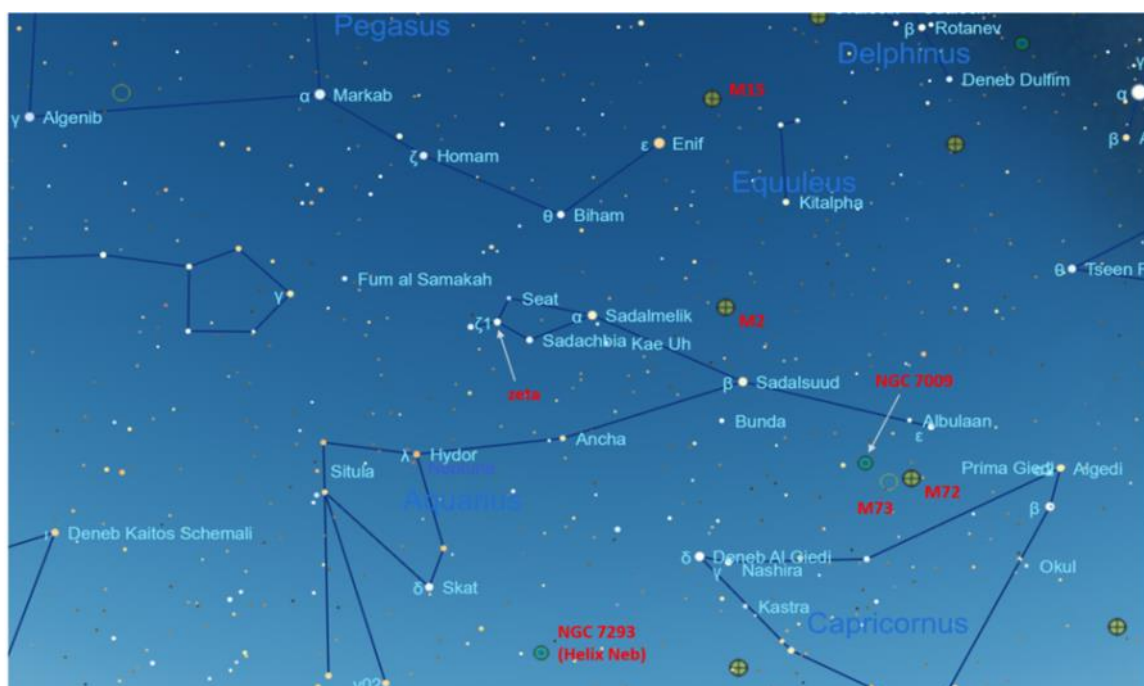
In a 10-12 inch telescope at 200x or more, the nebula reveals more detail, including two slender arms radiating in opposite directions from the center. It looks a little like the planet Saturn with nearly edge-on rings, so NGC 7009 is sometimes called the Saturn Nebula. In fact, the nebula spans about 45"x25", a little larger than the apparent size of the planet Saturn.



ABOVE: NGC 7009, the Saturn Nebula
(Image credit: www.astrosurf.com)

Zeta Aquarii – A Closely-Spaced Double Star

Now for the challenging double star zeta (ζ) Aquarii, which lies in a small closed asterism in Aquarius known as the "Water Jar". The components are separated by a very close 2.2", so you need magnification and steady sky to split it. A 3-inch at 100x can just barely do the job. A 4-6 inch scope at 150x gives a better view. But if the seeing is poor, it may not be possible to separate this star at all. Each component is clearly white and nearly the same brightness. The two stars of zeta revolve around each other every 500 years. The pair is about 100 light years away. Zeta Aquarii lies almost exactly on the celestial equator.



ABOVE: The location of the celestial sights highlighted in this tour.
Created with SkyX Serious Astronomer by Software Bisque.

...A Brief Tour of Aquarius

The Helix Nebula – A Large Planetary Nebula

The showpiece of the constellation Aquarius— in my humble opinion— is the grand and elusive Helix Nebula, NGC 7293. One of the closest and apparently largest of all planetary nebulae, the Helix is one of the few sights that's easier to see in a small telescope than in a large one. The nebula looks like an expansive eye in deep sky. Some refer to the Helix Nebula as the "Eye of God".

Like all planetary nebulae, the Helix is a region of rarefied gas thrown off by a dying star of moderate mass. The star is essentially ejecting its outer atmosphere and exposing its blazing hot core to full view. The Helix is distinguished from other planetaries by its relative proximity to Earth, about 700 light years, and its very large apparent size, about 1/4 degree. By comparison, the Ring Nebula in Lyra is some 2,000 light years away and appears about 10-15x smaller in diameter. The Helix gets its name from its ring-like appearance which resembles the two coils of a spring seen on axis.



ABOVE: Helix Nebula NGC 7293 Infrared image version taken by the Spitzer Space

When you first see the Helix Nebula, you may be astonished to discover how large it appears. Most planetaries are so small as to appear star-like, even at moderate power, so happening upon a planetary nebula that's half the size of the full Moon can be a little surprising, even for experienced observers. The apparent surface area of the nebula is about four times larger than M27, the Dumbbell Nebula, and more than 100x the area of the Ring Nebula (M57). Charles Messier missed this nebula, likely because his telescopes had a narrow field of view and did not enable him to notice such a large object with low surface brightness.

The Helix Nebula is located about 10° NW of the bright star Fomalhaut. It looks like a big moon-sized grey circle in a pair of binoculars. At low-to-medium power in a telescope, the nebula appears as a smokey oval set in a triangle of 10th-magnitude stars. At first it appears well defined and somewhat featureless. But keep looking. With averted vision, you'll begin to see the ring-like structure of this ghostly object in a 3" to 4" scope. A UHC or OIII filter is usually a big help with this nebula.

The central region appears transparent at low power, and slightly brighter than the background sky at medium power. The 13th-magnitude central star is a challenge with a 4" scope but a snap with a 6" or 8" reflector, especially at about 50x-80x. While higher magnification is useful for detecting the central star, anything more than 100x is wasted on the Helix Nebula.

Some observers at high altitudes and under dry sky claim to have seen the Helix without optics. If you have exceptionally clear and dry skies, give it a try. This will be much easier at southern latitudes where the nebula can be observed much higher in the sky.



RIGHT: The Aquarius Constellation

The Cover Image - Thor's Helmet - NGC 2359

Image by Gerald de Beer

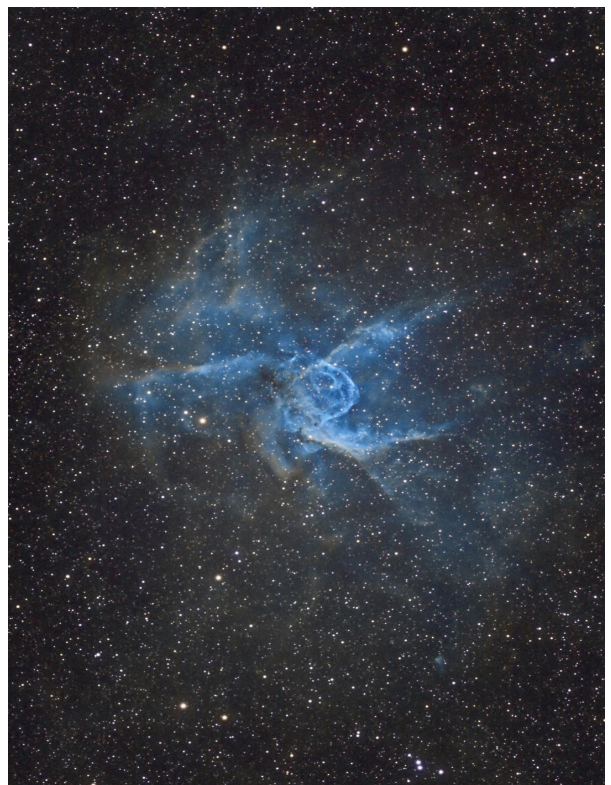
NGC 2359 (also known as **Thor's Helmet**) is an emission nebula in the constellation Canis Major. The nebula is approximately 3,670 parsecs (11.96 thousand light years) away and 30 light-years in size. The central star is the Wolf-Rayet star WR7, an extremely hot star thought to be in a brief pre-supernova stage of evolution. It is similar in nature to the Bubble Nebula, but interactions with a nearby large molecular cloud are thought to have contributed to the more complex shape and curved bow-shock structure of Thor's Helmet.

It is also catalogued as Sharpless 2-298 and Gum 4.

The nebula has an overall bubble shape, but with complex filamentary structures. The nebula contains several hundred solar masses of ionised material, plus several thousand more of unionised gas. It is largely interstellar material swept up by winds from the central star, although some material does appear to be enriched with the products of fusion and is likely to come directly from the star. The expansion rate of different portions of the nebula varies from 10 km/s to at least 30 km/s, leading to age estimates of 78,500 - 236,000 years. The nebula has been studied at radio and x-ray wavelengths, but it is still unclear whether it was produced at the class O main sequence stage of development, as a red supergiant, luminous blue variable, or mainly as a Wolf-Rayet star.

TECH SPECS:

- TELESCOPE: Astro-Tech 127EDT .
- MOUNT: Celestron CGEM Mk I
- IMAGING: : ZWO ASI2600MM Pro Cooled
- FILTERS: ZWO 6nm NB
- GUIDING: Orion 60mm guidescope
ZWO ASI290 mini mono guide camera
PHD2 Multistar Guiding
- FOCUS: Sesto Senso 2 Robotic Focuser
- SOFTWARE: N.I.N.A Imagng Software
Lightroom
PixInsight
- FRAMES: 13 x Ha 240 sec
11 x Sii 240 sec
15 x Oiii 240 sec
- GAIN: All @ 100; Offset 50; -10°C
- FLATS/DARKS: None



UKZN Smashes Africa's Rocket Launch Record

By Corinne Gill

South Africa's astronautics skills are slowly but surely reaching new heights - literally. A hybrid sound rocket built by a team of engineers at the University of KwaZulu-Natal affiliated AeroSpace Systems Research Group (ASReG), recently travelled nearly 18 km in the sky successfully breaking African rocket records for distance travelled.

While the African world record stood at a whopping 10.3km, the UKZN rocket smashed this rising to 17.9 km.

The story starts with the Phoenix Hybrid Sounding Rocket Program which was started at rocket built by a team of engineers at the UKZN affiliated AeroSpace Systems Research Group in 2010.

This was due to a program being started with South Africa's Government's prioritisation of skills and resource development in space-related research.

The objectives of the program were:

- to develop a series of civilian sounding rockets that have the capacity to meet the requirements of the South African and African scientific communities.
- to stimulate novel research into hybrid propulsion systems at UKZN.
- to inspire students to pursue graduate studies at the School.
- to generate interest in rocket propulsion, flight dynamics analysis and airframe design in South Africa generally

Sounding rockets, unlike satellites which orbit around the earth, carry experimental payloads for research purposes. These instruments are used to study astronomy, astrophysics, materials science, and meteorology.

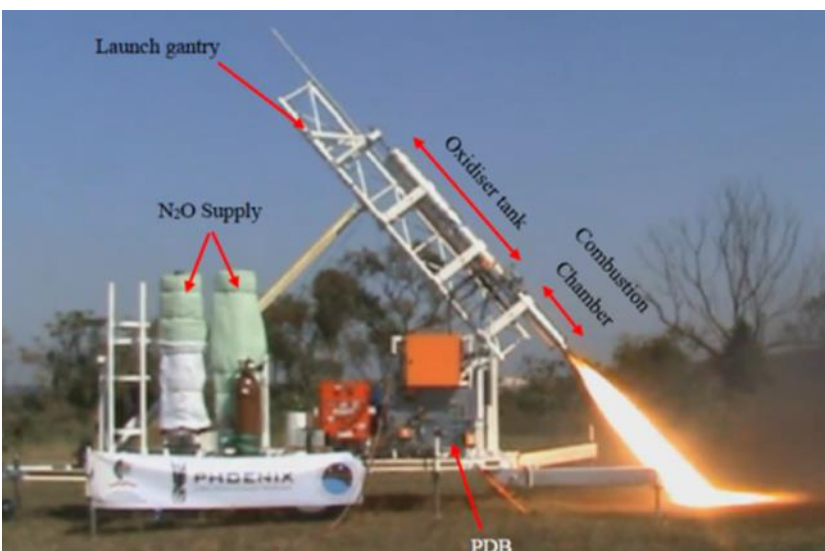
THE HISTORY OF THE HYBRID ROCKETS

Phoenix-MK1A

The original Phoenix-MK1A rocket, was developed by UKZN between 2010 and 2014. It was a sounding rocket which was more of a technology demonstration/test vehicle to gain experience in experience in hybrid sounding rocket design, development and testing . It was the first to be

developed by ASReG to get to an altitude of about 10 km with a payload of 1 Kg but was being tested to assess the systems within the vehicle, such as the recovery systems.

After 3 failed hot-fire tests due to ignition failures from the conical injector. an axial injector was used which resulted in a successful hot-fire test being conducted in August 2013 which design was achieved and undertaken in collaboration with RDM in the Western Cape.



... Africa's Rocket Launch Record Smashed



For the final test, the engineers transported the Phoenix-MK1A rocket parts via road over a distance of 1 700 km from KZN, to the Denel Overberg Testing Range in Arniston, Western Cape in August 2014.



The engineers assemble the Phoenix-1A, and they all signed on the tail of the rocket in anticipation of the launch which launch angle was limited to 75° resulting in a flattened flight path' for safety reasons.



The vehicle was watched and monitored from the Denel mission control blockhouse with the telemetry systems recording vehicle altitude, atmospheric pressure, and most importantly, providing video feeds from high definition cameras in the rockets, showing footage of the rocket launch.

... Africa's Rocket Launch Record Smashed

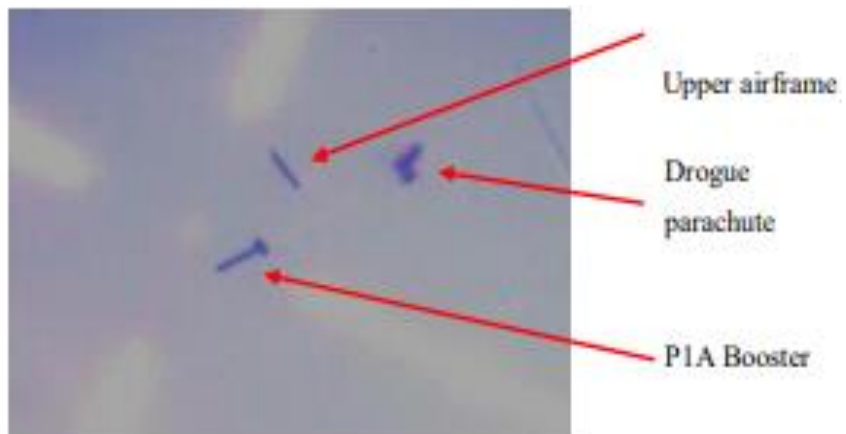


At the rocket launch, it achieved a maximum velocity of 203.8 m/s and a peak acceleration of 30.3 m/s².

However, the rocket failed to achieve the desired altitude, due to under-fueling and nozzle failure caused by damage during lift-off. This resulted in the vehicle to 'cork-screw' during the powered phase of the launch, resulting in a reduced apogee of 2.5 km.

The tracking cameras showed a successful separation with the drogue parachute being deployed at apogee.

Unfortunately, the failure of the shock cord to constrain the drogue parachute to the vehicle, resulted in the destruction of the booster due to the resultant flattened trajectory. Resulting the in the shearing of the shock cord due to the larger than expected aerodynamic loading on the drogue all caused by the flattened trajectory.



Impact occurred 4 km from the launch pad which resulted in the destruction of the vehicle and all the onboard data storage .



... Africa's Rocket Launch Record

The Phoenix-1B - Design and Development

After the failure of the Phoenix-1A, the aim of this research was to develop and improve on the design and performance of the prototype demonstrator and thereby develop and test the new technologies resulting in a workhorse hybrid sounding rocket, named Phoenix-1B, to serve as a reliable platform for future hybrid rocket research at the University of KwaZulu-Natal (UKZN).

The Phoenix-1B was developed to serve as a reliable platform for future hybrid rocket research including the hybrid propulsion technology, nozzle and injector design. It was designed to be modular and practical, whilst being cost-effective and thus less expensive and easier to manufacture to aid this goal. This would enable select components to be amended without redesigning the entire rocket.

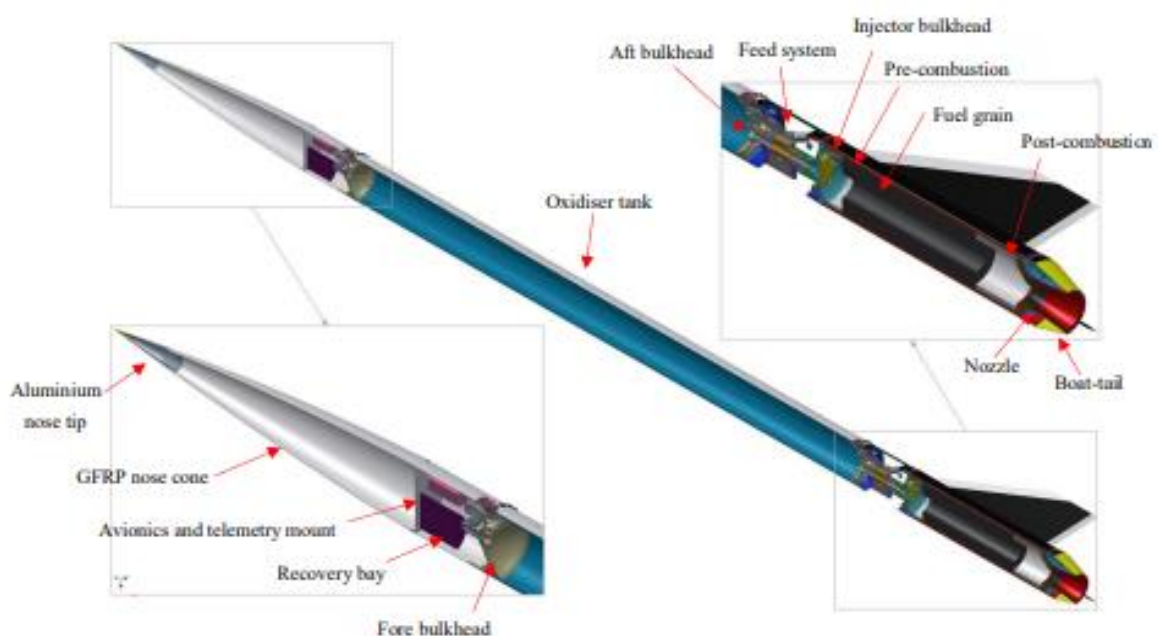
Analysing the shortcomings of the Phoenix-1A was a starting point, providing the initial design criteria and areas of focus for P1B, the new hybrid rocket.

The focus of this research was the propulsion system, with specific attention being paid to the nozzle and injector designs due to the predecessors failures.

The nozzle was redesigned with the help of Rheinmetall Denel Munition who provided design advice in response to structural problems experienced in the Phoenix-1A. Consequently, an iterative transient thermo-structural analysis was conducted on the nozzle, resulting in an optimised design able to sustain the higher operating temperatures as well as mitigate the risk of failure as was encountered with the Phoenix-1A nozzle. In addition the nozzle has a steel casing which provides structural support to the silica phenolic insulation and graphite throat insert. The rocket went through the cold and hot testing stages to ensure the nozzle worked.

Further more, an analysis of the effect of aluminum loading in the paraffin wax fuel grain, indicated a potential rocket mass reduction of 23 kg when transitioning from a pure paraffin grain to one containing 40% aluminum by mass.

Whilst most of the work focused on the propulsion system, an aerodynamic study was applied to aerodynamic design study was conducted of the rocket airframe. The 1 m long $\frac{3}{4}$ parabolic glass fibre reinforce plastic nose cone was designed along with four tapered swept fins. Enhancing the surface resistance and alignment.



... Africa's Rocket Launch Record



The Phoenix-1B Flight Test

On 16 February 2019, five years after the first launch, the Phoenix-1B Hybrid rocket parts and engineers were transported down to the Denel Overberg testing range.

Unfortunately, straight after the launch, the rocket, experienced software failure resulting in the motor to shutting down due to a malfunction in an electrically



actuated oxidiser flow control valve located between the propellant tank and the motor. The valve closed unexpectedly, starving the propellant motor and shutting off the thrust.

This resulted in the rocket only launching just under 20 meters above the platform before it was on it's way back down again, landing on the launch pad and causing an explosion that sent the rocket shooting off at a 45-degree angle.

The Phoenix hybrid rocket project emerged out of Broughton's Masters in Engineering research in 2017.



Kai Mitchell Broughton, being the Team lead and Mechanical Engineer at the Group, said "We have been working on the Phoenix-1B Mark 2 since 2017."

A thorough investigation of what went wrong in the launch failure of the 90 kg, 5m long rocket was conducted and the team followed stringent testing processes to rebuild the launch vehicle for a successful launch.

We had a break thereafter and this is when we put together a team of post-grads and PhD students to help rebuild the rocket.

We had about ten part-time engineers and undergraduate students working on the sub-systems to put together the vehicle again, and we reused a few parts that were not damaged from the first launch.



We have recently completed the testing and will be launching. This particular rocket was designed to go about 35 km high. We wanted to push the amateur sounding rocket record in Africa, which is 10.3 km. But for now, we are pushing for a 20 km height as the primary objective."

... Africa's Rocket Launch Record Smashed

Research & Development

In November 2020, Rheinmetall Denel Munition (RDM), a German defense equipment production company signed an agreement with the University of KwaZulu-Natal (UKZN), on rocket propulsion technologies, including collaborating on a liquid propellant rocket engine project named SAFFIRE to usher the development of a commercial satellite launch vehicles.

The SAFFIRE initiative, a new rocket propulsion technology using a mix of liquid and solid propellants, including collaborating on a liquid propellant rocket engine – South African First Integrated Rocket Engine – was a project created by UKZN's Aerospace Systems Research Group (ASReG).

Conventional liquid rocket engines utilise turbopump (turbine and pump) technology to achieve the required mass flow rate and pressure rise of the propellants fed to the combustion chamber. SAFFIRE makes use of an electro-pump system which dispenses with the gas-driven turbine of a normal turbopump and replaces it with an electric drive system.

This consists of two brushless DC motors and separate high density lithium-polymer battery banks to drive each pump. The flow rate and pressure rise specifications for the pumps were obtained from the required engine performance.

Dr Jean Pitot, the leader of the ASReG said the MkIIr rocket was a high performance version of the initial Mk I rocket which “demonstrates low-cost and robust construction methodologies coupled with advanced fabrication and propellant technologies.” It is the third rocket variant to be developed and launched by the UKZN's Aerospace Systems Research Group (ASReG) since earlier failures in 2014 and 2019.

Satisfied with their success, Kai Broughton, lead engineer on the project, and a UKZN PhD student at ASReG said this was a huge success for himself and his team as it validated the work they have done over the years.



Africa's Rocket Launch Record Smashed

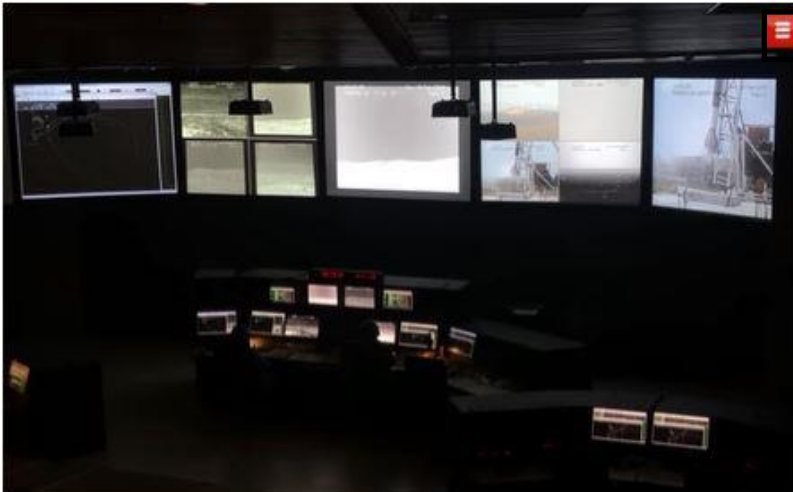
Record Breaking Phoenix-1B Mark IIr

KZN's much anticipated Phoenix hybrid rocket test flight, was launched at Denel Overberg Test Range in the Western Cape, approx. 200 km outside of Cape Town at 16:00 on Monday 8 March 2021.

The flight commenced after a brief reprieve in the weather, providing suitable launch conditions.

After signing the fins pre-launch - a tradition in rocketry research - the team retreated to the mission control blockhouse from where the nerve racking countdown was initiated.

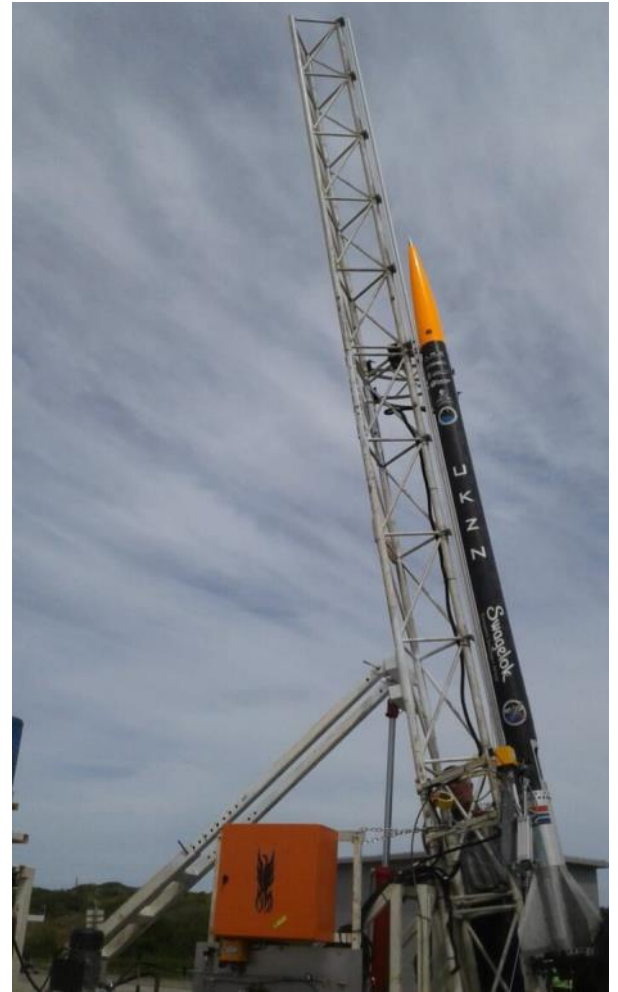
"At 16:47 Mk IIr blasted off and the exultant team broke into cheers as the rocket reached a 17.9 km altitude, setting the new African record," said UKZN spokesperson Indu Moodley



twice the speed of sound, and claiming the record for the highest flown indigenous rocket on the African continent. The developers of the University of KwaZulu-Natal's rocket confirmed that the projectile was launched seawards for safety measures and was not recovered after the launch.

"The team is delighted to see all their hard work come to fruition with a picture-perfect flight, which exceeded our expectations." said Dr Jean Pitot, the leader of UKZN's Aerospace Systems Research Group (ASReG). Adding it was a relief that the launch was a success; after the previous attempts.

"This launch is the culmination of months of preparation. We had to move an entire rocket team, it's launch platform, two rockets, multiple backup parts, computer equipment and everything that goes with it, 1 700 km across the country, It as a massive undertaking, but the work has paid off.



The Phoenix-1B Mark 2r vehicle was aimed at reaching 15 km but soared to a new high-altitude mark for hybrid-rockets, of 17.9 km, beating the previous record of 10.3 km by over 7 km. It reached speeds nearing 2 500 k/ph,

The engineering team that broke the record
Image: Supplied Source: UGC



Launch of the Record
Breaking Phoenix-1B Mark



Asteroid Occultations

By Nigel Wakefield

There are two asteroidal occultations for Durban towards late April. The first on the 19th, covers the whole of the Durban area while the second, on 24th, will be best viewed from just south of Durban but at a fairly convenient time in the evening. Both should be easy with the stars of mag 10. If the stars cannot be identified in planetarium software, I can always send a star map. (*Thanks Nigel...editor.*)

IOTA/IOTA-ES occultation update for
(271 Pentesilea / TYC 6803-02137-1 event on 2021 Apr 19, 03:22 UT
Visible from S Africa, South America

Summary

On 2021 Apr 19 UT, the 63.1 km diameter asteroid (271) Pentesilea will occult a 10.4 mag star in the constellation Scorpius for observers along a path across S Africa, South America.

In the case of an occultation, the combined light of the asteroid and the star will drop by 4.72 mag to 15.15 mag (the magnitude of the asteroid) for at most 9.3 seconds.

This update is based on, astrometry for the asteroid kindly provided by the IAU Minor Planet Centre.

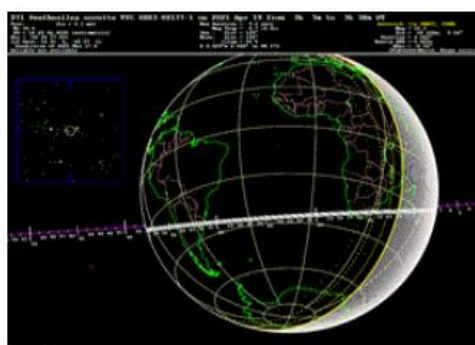
This work has made use of data from the European Space Agency (ESA) mission Gaia <http://www.cosmos.esa.int/gaia>), processed by the Gaia Data Processing and Analysis Consortium (DPAC, <http://www.cosmos.esa.int/web/gaia/dpac/consortium>). Funding for the DPAC has been provided by national institutions, in particular the institutions participating in the Gaia Multilateral Agreement.

The event at a glimpse

- * Rank: 71
- * Date and approx. time of event: 2021 Apr 19, 03:06 - 2021 Apr 19, 03:38
- * Geocentric midpoint of event [JD]: 2459323.64056667
- * Magnitude of target star: 10.44
- * Magnitude drop [mag]: 4.72
- * Estimated maximum duration [s]: 9.3
- * Moon: 38 % sunlit, 144° distance
- * Sun: 139° distance
- * Rough path description: S Africa, South America

The occultation path

- * Approximate projected width [km]: 64
- * 1 sigma uncertainty interval [path widths]: +/- 0.83
- * 1 sigma uncertainty interval [seconds]: +/- 5.3
- * 1 sigma uncertainty interval approx. RA,DE ["]: (+/- 0.021, +/- 0.029)
- * 1 sigma uncertainty ellipse (major, minor, PA): (0.029", 0.020", 172°)
- * Approx. speed of asteroid's shadow [km/s]: 6.7995
- * Website for maps: <http://www.asteroidoccultation.com>



Event Date: 19 Apr 2021, 03:22
Asteroid: (271) Pentesilea
Star: TYC 6803-02137-1(10.4)
Mag Drop: 4.72
Duration: 9.3 seconds (max)

Status: Current
Visibility: S Africa, South America
Sigma: 0.07 pathwidths
Comments:

... Asteroid Occultations

Path Coordinates:

Occultation of TYC 6803-02137-1 by 271 Pentesilea on 19th April 2021

| | CENTRE | U.T. | STAR | STAR | SUN | PATH | LIMITS | ERROR | LIMITS | ALT |
|------------|-----------|-----------|------|-------|------|-----------|-----------|-----------|-----------|------|
| Longitude | Latitude | Time | Alt | Az | Alt | Alt | Limit 2 | Limit 3 | Limit 4 | Crn |
| ° ' " | ° ' " | h:m:s | deg° | deg ° | deg° | ° ' " | ° ' " | ° ' " | ° ' " | |
| - 32 00 00 | -37 02 37 | 3:27:00.2 | 70 | 65 | -59 | -36 45 13 | -37 20 03 | -36 16 28 | -37 48 53 | 0.18 |
| - 31 00 00 | -37 06 44 | 3:26:48.2 | 70 | 64 | -58 | -36 49 20 | -37 24 08 | -36 20 36 | -37 52 58 | 0.18 |
| - 30 00 00 | -37 10 29 | 3:26:36.3 | 71 | 62 | -57 | -36 53 06 | -37 27 53 | -36 24 23 | -37 56 42 | 0.18 |
| - 29 00 00 | -37 13 53 | 3:26:24.3 | 72 | 60 | -57 | -36 56 30 | -37 31 17 | -36 27 49 | -38 00 05 | 0.18 |

Uncertainty in time = +/- 8 secs
Prediction as of 2021 Feb 28

Data for the Target star

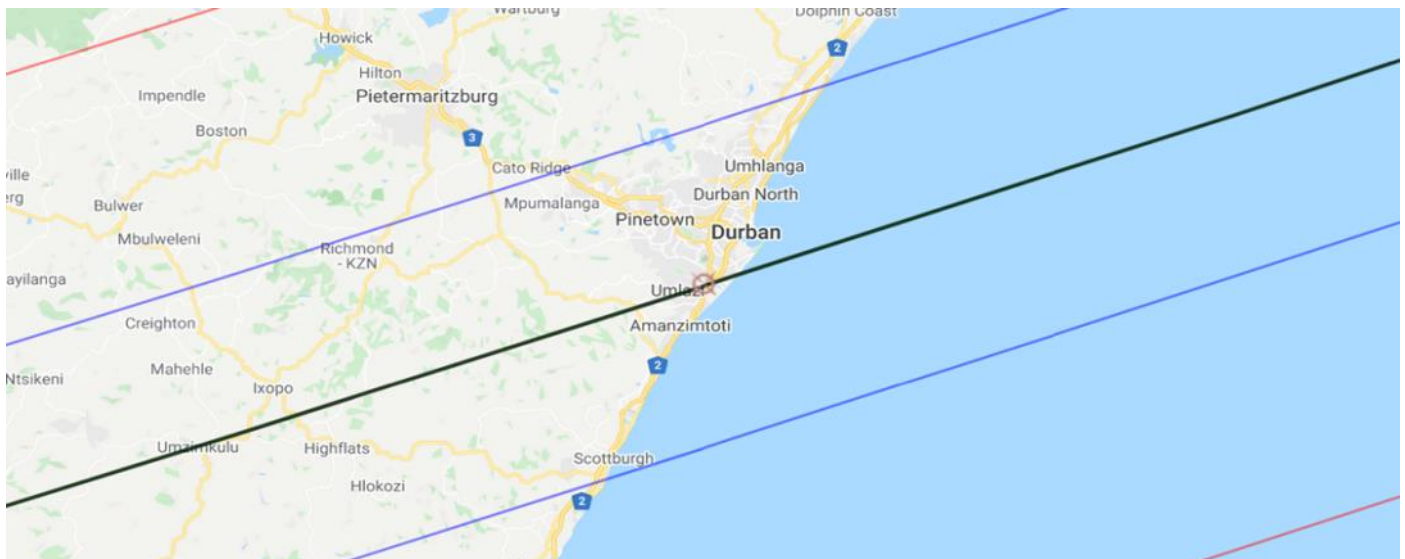
- * Name: TYC 6803-02137-1
- * Constellation : Scorpius
- * BCRS position with proper motion to date of event [h,m,s ; °, ', "]
RA: 16 29 46.4028 DE: -26 34 17.301
- * GCRS Astrometric position with proper motion and parallax to date of event [h,m,s ; °, ', "]
RA: 16 29 46.4030 DE: -26 34 17.302
- * Position source: Gaia EDR3
- * Standard error: RA,DE [mas]: (0.100,0.100)
- * V mag [mag]: 10.4
- * Diameter [mas]: 0.00

Data for the Minor planet

General information:

- * Number & name: (271) Pentesilea
- * Asteroid class:
- * Approx. diameter [km]: 63
- * Approx. diameter ["]: 0.035
- * Distance from Earth [AU]: 2.45510
- * Asteroid position offset in RA [mas]: 0
- * Asteroid position offset in DE [mas]: 0

Calculator (s): Steve Preston ; Date of update: 2021 Feb 28, 22:23 UT
Steve Preston, 7640 NE 32nd St, Medina, WA 98039 stevepr@acm.org



... Asteroid Occultations

IOTA/IOTA-ES occultation update for
(547) Praxedis / TYC 0193-00821-1 event on 2021 Apr 24, 19:21 UT
Visible from South Africa

Summary

On 2021 Apr 24 UT, the 63.1 km diameter asteroid (547) Praxedis will occult a 10.0 mag star in the constellation Canis Minor for observers along a path across S Africa.

In the case of an occultation, the combined light of the asteroid and the star will drop by 5.29 mag to 15.30 mag (the magnitude of the asteroid) for at most 3.0 seconds.

This update is based on, astrometry for the asteroid kindly provided by the IAU Minor Planet Centre.

This work has made use of data from the European Space Agency (ESA) mission Gaia (<http://www.cosmos.esa.int/gaia>), processed by the Gaia Data Processing and Analysis Consortium (DPAC, <http://www.cosmos.esa.int/web/gaia/dpac/consortium>). Funding for the DPAC has been provided by national institutions, in particular the institutions participating in the Gaia Multilateral Agreement.

The event at a glimpse

- * Rank: 87
- * Date and approx. time of event: 2021 Apr 24, 19:17 - 2021 Apr 24, 19:25
- * Geocentric midpoint of event [JD]: 2459329.30668750
- * Magnitude of target star: 10.02
- * Magnitude drop [mag]: 5.29
- * Estimated maximum duration [s]: 3.0
- * Moon: 92 % sunlit, 64° distance
- * Sun: 86° distance
- * Rough path description: S Africa

The occultation path

- * Approximate projected width [km]: 88
- * 1 sigma uncertainty interval [path widths]: +/- 0.58
- * 1 sigma uncertainty interval [seconds]: +/- 1.4
- * 1 sigma uncertainty interval approx RA,DE ["]: (+/- 0.014, +/- 0.018)
- * 1 sigma uncertainty ellipse (major, minor, PA): (0.018", 0.014", 174°)
- * Approx speed of asteroid's shadow [km/s]: 20.7468
- * Website for maps: <http://www.asteroidoccultation.com>

Path Coordinates:

Occultation of TYC 0193-00821-1 by 547 Praxedis on 2021 Apr 24

| | CENTRE | U.T. | STAR | STAR | SUN | PATH | LIMITS | ERROR | LIMITS | ALT |
|------------|-----------|------------|------|-------|------|-----------|-----------|-----------|-----------|------|
| Longitude | Latitude | Time | Alt | Az | Alt | Limit 1 | Limit 2 | Limit 3 | Limit 4 | Crn |
| ° ' " | ° ' " | h:m:s | deg° | deg ° | deg° | ° ' " | ° ' " | ° ' " | ° ' " | |
| - 32 00 00 | -41 51 02 | 19 20 12.5 | 41 | 12 | -0 | -42 16 29 | -41 25 47 | -42 46 08 | -40 56 50 | 0.97 |
| - 31 00 00 | -41 34 57 | 19 20 16.5 | 42 | 10 | -1 | -42 00 23 | -41 09 42 | -42 30 00 | -40 40 47 | 0.97 |
| - 29 00 00 | -41 18 54 | 19 20 20.6 | 42 | 9 | -2 | -41 44 19 | -40 53 40 | -42 13 55 | -40 24 46 | 0.97 |
| - 30 00 00 | -41 02 53 | 19 20 24.7 | 42 | 8 | -2 | -41 28 17 | -40 37 41 | -41 57 52 | -40 08 47 | 0.97 |
| - 28 00 00 | -40 46 56 | 19 20 28.8 | 43 | 6 | -3 | -41 12 19 | -40 21 44 | -41 41 52 | -39 52 52 | 0.97 |

Uncertainty in time = +/- 2 secs
Prediction of 2021 Feb 28.0

... Asteroid Occultations

Data for the Target star

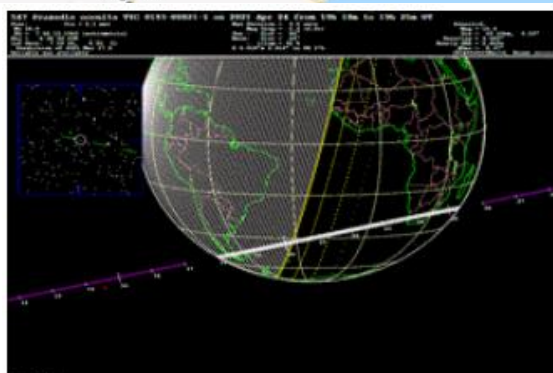
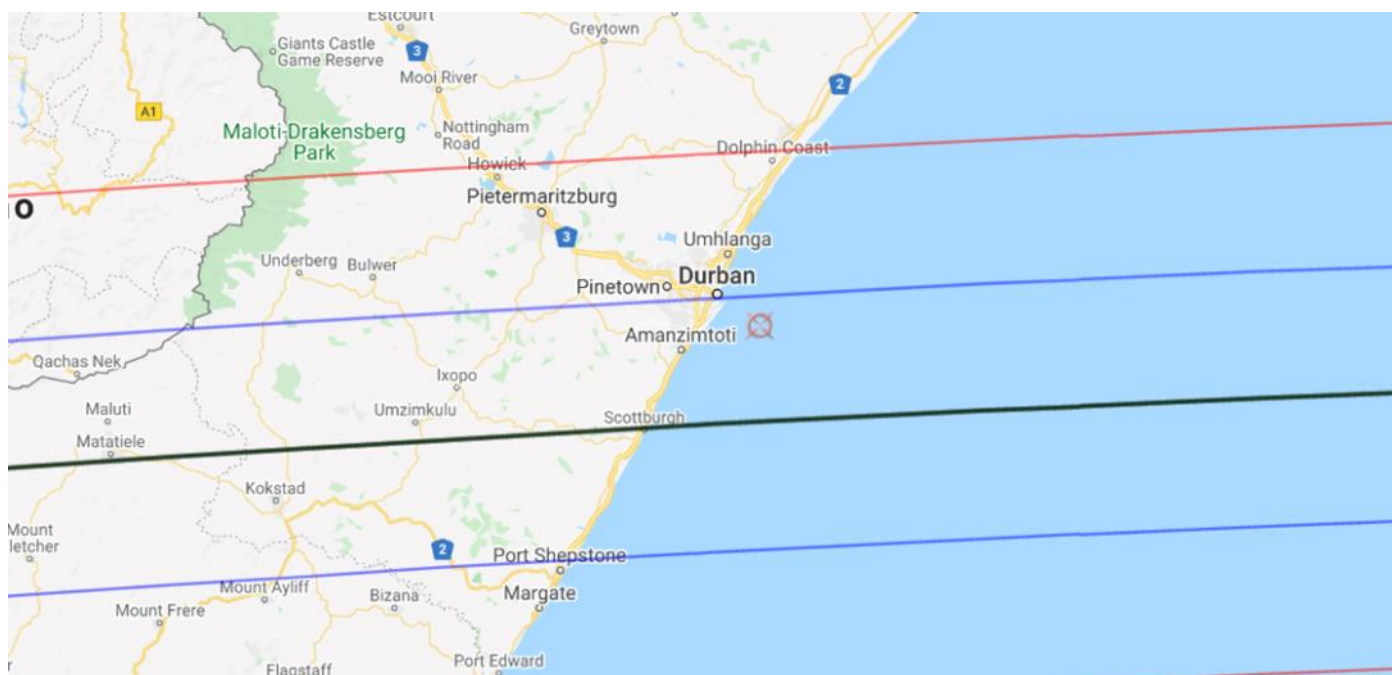
- * Name: TYC 0193-00821-1
- * Constellation : Canis Minor
- * BCRS position with proper motion to date of event [h,m,s ; °,']
RA: 07 58 19.1443 DE: +06 28 30.698
- * GCRS Astrometric position with proper motion and parallax to date of event [h,m,s ; °,']
RA: 07 58 19.1442 DE: +06 28 30.698
- * Position source: Gaia14_DR2
- * Standard error: RA,DE [mas]: (1.200,0.500)
- * V mag [mag]: 10.0
- * Diameter [mas]: 0.00

Data for the Minor planet

General information:

- * Number & name: (547) Praxedis
- * Asteroid class:
- * Approx. diameter [km]: 63
- * Approx. diameter ["]: 0.032
- * Distance from Earth [AU]: 2.74850
- * Asteroid position offset in RA [mas]: 0
- * Asteroid position offset in DE [mas]: 0

Calculator (s): Steve Preston ; Date of update: 2021 Feb 28, 22:23 UT
Steve Preston, 7640 NE 32nd St, Medina, WA 98039 stevepr@acm.org



Event Date: 24 Apr 2021, 19:21

Asteroid: (547) Praxedis

Star: TYC 0193-00821-1(10.0)

Mag Drop: 5.29

Duration: 3.0 seconds (max)

Status: Current

Visibility: S Africa

Sigma: 0.14 pathwidths

Comments:

ASSA GM – 10th March 2021

Joint meeting with ASSA JHB centre, who organised the speaker.

**Attendees:**

| Durban | JHB | Other centres, unknown and Guests |
|------------------------------|--------------------------|-----------------------------------|
| 1. Claire Odhav | 1. Carmel Ives | 1. Adriana Marais - speaker |
| 2. Graham Alston | 2. Tessa Collins | 2. Chris - CT |
| 3. Piet Strauss | 3. Alison Coulter | 3. LLP - PMB |
| 4. Don Orsmond | 4. Etsuo Takayanagi | 4. Robin Horn CT |
| 5. Chanu Chetty, Dr. | 5. Andy Overbeek | 5. Cat S61 |
| 6. Francesco Petrucioni | 6. Guilia Barr | 6. Hisense Infinity E30 |
| 7. Mike Hadlow | 7. Brendon Fairhurst | 7. Richard Francis |
| 8. John Gill | 8. Michael Pote | 8. Galaxy A31 |
| 9. Sihle Kunene | 9. Hazel Hall | 9. LOL |
| 10. Roger Bond | 10. Johan Viljoen | 10. Preneven Naicker |
| 11. Peter and Hettie | 11. Gil and Maeve Jacobs | 11. Malcolm |
| 12. Corinne Gill | 12. Catherine Mac Kinnon | |
| 13. Ooma Rambilas | 13. Chris Stewart | |
| 14. Debbie Abel | 14. John Lindsay-Smith | |
| 15. Yesen Govender | 15. Dave Blane | |
| 16. Bheki Mnguni | | |
| 17. Brian Finch | JHB Visitors | |
| 18. Cheryl Venter | 1. Johann Swanepool | |
| 19. Sheldon Seymour | 2. Tim Cooper | |
| 20. Barry Haselau | 3. Barry Greyling | |
| 21. Michelle Mackenzie-Mills | 4. Vikas Negi | |
| 22. Mitch Tyler | 5. Cor Rademeyer | |
| 23. Grant Trebble | 6. Warwick Ham | |
| 24. Michael Watkins | | |

1. 7:30 Meeting starts
2. Carmel Ives, from ASSA JHB welcomes everyone, and explains the format of the meeting.
3. 7:35 Dr. Adriana Marais begins her presentation on "Off world-exploration-driven innovation.

Adriana is a Director at the Foundation for Space Development, an initiative of which is Africa2Moon, Africa's first mission to the Moon, to positively impact lives in Africa through space technology. She is also a member of the South African Government Ministerial Task Team on the 4th Industrial Revolution, Faculty at the Singularity University and Duke Corporate Education, and an astronaut candidate with the Mars One Project.



...Minutes of the Meeting

Previously, Adriana was Head of Innovation at SAP Africa between 2017 and 2019. Her career began in academia, and she holds an MSc (summa cum laude) in quantum cryptography and a PhD in quantum biology. Her award-winning postdoctoral research focused on quantum effects in photosynthesis as well as the origins of prebiotic molecules and life itself. She is currently pursuing a second PhD in team dynamics in extreme environments at the University of Cape Town's Graduate School of Business.

Credit: adrianamarais.org; proudlyhuman.com

4. 8:00 question and answer time
5. 8:41 DBN members sign out and join our own meeting.

8:45 DBN Members meeting:

1. Apologies:

- Bill and Carole Cuthbert
- Moya O'Donoghue
- Maryanne Jackson
- Clinton and Jackie Armitage
- Sally Stretch
-

2. Attending:

- Graham Alston
- Claire Odhav
- Corinne Gill
- Pieter Strauss
- Gerald de Beer
- Don Orsmond
- Mike Hadlow
- Brian
- Debbie Abel
- Yesen Govender
- Peter and Hetie
- John Gill
- Jean Senogles
- Sheryl Venter
- Roger Bond
- Michael Watkeys



...Minutes of the Meeting

3. Forthcoming Speakers:

- April - Matt Hilton Stellar evolution next month
- May - Hoping to arrange the rocket scientist from UKZN to speak. TBC

4. Matters arising from previous minutes:

- Moya attended the meeting

5. Sutherland

Our preferred option is in October, which is quieter, possibly 15th, just after the schools close.

Waiting to see what will happen with COVID and travel.

Proposed travel itinerary:

| Sutherland & Hermanus Trip Proposal | |
|-------------------------------------|------------|
| | |
| Depart to Cape Town | 15/10/2021 |
| Travel to Sutherland | 15/10/2021 |
| Overnight Sutherland | 15/10/2021 |
| Overnight Sutherland | 16/10/2021 |
| Travel to Hermanus | 17/10/2021 |
| Overnight Hermanus | 17/10/2021 |
| Hermanus Observatory am | 18/10/2021 |
| Depart CT-Durban pm | 18/10/2021 |

There is also the option of spending another night in CT, and visiting the planetarium and SAAO.

Cost will need to be adjusted for those who are interested.

Flight costs have currently gone up. Hopefully by October they will go down.

6. Treasurers report:

- Need to advertise the sky guides on FB
- Could offer as a package for R150 rand together
- Sky guide only at that price for members.
- Offer a guide, a mask and membership for a bundle



...Minutes of the Meeting

6. Treasurer's report - (Cont)

ASSA DURBAN FINANCIALS

| Financials Meeting | Month | Current | Investment | Cash |
|--------------------|------------|-------------|-------------|----------|
| General Meeting | 2021-03-10 | R 12,411.46 | R 59,361.60 | R 732.00 |

ASSA DURBAN - MEMBERS

| Date | No off | Paid Members | Honoury | Unpaid |
|------------|--------|--------------|---------|--------|
| 2021-03-10 | 106 | 106 | 3 | 0 |

SKY GUIDES & MASKS

| Date | Date | No Ordered | Purchased | Available |
|------------|------------|------------|-----------|-----------|
| Sky Guides | 2021-03-10 | 70 | 51 | 19 |
| Masks | 2021-03-10 | 50 | 23 | 27 |

7. General:

- Mixed meetings are going well.
- Suggestion to offer the Finland society to join our meetings. - Don
- Newsletter from the Southern Cross in Oz
- And offer the PMB group to join us
- Noddy Badge to John for an especially interesting 'nDaba this month
- Gerald tells us about his new scope/camera, and shares pics.
- Need another astrophotography course.
- Question: How to answer when people ask you about what telescope to buy.

Answer: ASSA has some guidelines on that. Piet will send it out.

Telescopes are very specific to what you would like to view.

- Suggest having viewing nights again.

We can restrict it to x amount of people, and folks have to book. With correct COVID protocols in place.

9:36 Chairman closes the meeting.



The Biggest Asteroid of 2021

Zoomed past on 2021-03-21

Asteroid 2001 FO32 otherwise known as 231937, zoomed past Earth at an unusually fast speed for a space rock at 177,000 mph (24,000 kph) but posed no danger to us as it passed at a safe range of 1.25 million miles (2 million kilometers, according to NASA. Asteroid 2001 FO32 is up to 680 meters wide, the actual size of the of the California's famous Golden Gate Bridge, and it won't come that close to Earth again until 2052.

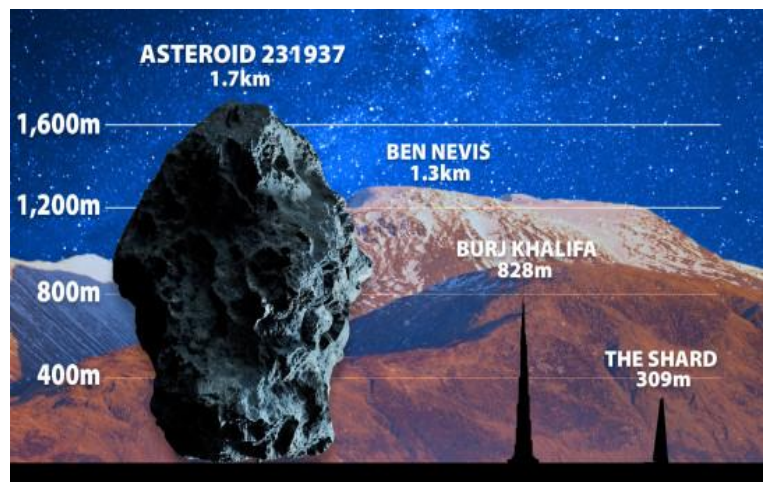
"The reason for the asteroid's unusually speedy close approach is its highly inclined and elongated (or eccentric) orbit around the sun, an orbit that is tilted 39 degrees to Earth's orbital plane," NASA officials wrote in a statement. "This orbit takes the asteroid closer to the Sun than Mercury and twice as far from the sun as Mars".

Like a rock rolling down a hill, asteroid 2001 FO32 picks up speed as it falls inward toward the Sun and then slows as it heads back out toward Mars. The asteroid takes more than two years (810 days to be exact) to complete one orbit and won't pose an impact risk to the Earth for centuries, despite 2001 FO32's classification as a "potentially dangerous asteroid," NASA said.

NASA and astronomers around the world regularly seek and track asteroids that could pose an impact hazard to Earth. Asteroid 2001 FO32 was first spotted in 2001 by the Lincoln Near-Earth Asteroid Research (LINEAR) program in Socorro, New Mexico. Observations by NASA's NEOWISE space telescope suggest the asteroid is between 1,300 and 2,230 feet (440 to 680 m) wide.

"Even if it is at the smaller end of the scale, 2001 FO32 will still be the largest asteroid to pass this close to our planet in 2021," NASA officials wrote. "The last notably large asteroid close approach was that of 1998 OR2 on April 29, 2020. While 2001 FO32 is somewhat smaller than 1998 OR2, it will be three times nearer to Earth."

Credit: SPACE.com



A size guide showing how big Asteroid 2001 FO32 is (Metro.co.uk)



"Have you ever wondered what would happen if a giant hair ball were to slam into the earth?"



"All I'm saying is now is the time to develop the technology to deflect an asteroid."



Public Viewing Roster ASSA Durban



Watch this space for viewing
& refer to the website
www.astronomydurban.co.za
for further updates

| Name | Phone | Name | Phone | New Moon | Public Viewing |
|------|-------|------|-------|---------------|----------------|
| TBC | TBA | TBC | TBA | 12 April 2021 | 19 April 2021 |
| TBC | TBA | TBC | TBA | May 2021 | 14 May 2021 |
| TBC | TBA | TBC | TBA | 10 Jun 2021 | 11 June 2021 |
| TBC | TBA | TBC | TBA | 10 July 2021 | 19 July 2021 |

PUBLIC VIEWING NOTICE:

Viewing at the Dome and around the pool will possibly resume in May depending on the Covid lockdown levels and restraints..

Please note there will be a roster with a booking system viewing once the number of telescopes are confirmed for those interested in attending. Kindly note all will be required to adhere to the Covid & social distancing regulations.

Dates and times will be advised once the committee has completed the training of the Dome Masters & Viewing Assistants.

VOLUNTEERS REQUIRED:

- Dome Master - Taking responsibility for the viewing evenings and learning how to set up, manage and use the new telescope
- Viewing Assistant - Learning about the new telescope, assisting with the viewing evenings, assisting viewing members as required.
- Telescope Managers - Members willing to bring their telescopes to the viewing evenings to set up around the pool for public viewing.

NOTIFY OBSERVATORY MANAGER:

Members interested in attending the above and/or becoming involved in assisting with the viewing evenings, please send your names to Mike Hadlow at the following address: mike@astronomydurban.co.za

Volunteers to please identify which role you are willing to assist with, Viewing Member, Dome Master, Viewing Assistant or Telescope Manager..

After which, attendance will be confirmed and viewing dates will be announced.



Notice Board

MEETINGS:

- Next General Meeting will be held via ZOOM on **Wednesday 10th March 2021**
- All Star Parties, Out-reach and Public viewing are on hold due to Covid 19 restrictions

MNASSA:

- Monthly Notes of the Astronomical Society of Southern Africa.
- Available at www.mnassa.org.za to download your free monthly copy.

NIGHTFALL:

- Fantastic astronomy magazine, go check it out.
- Available from the ASSA website assa.saao.ac.za/sections/deep-sky/nightfall/

MEMBERSHIP FEES & BANKING: **Please Note: Membership fees to be updated after the AGM** **Membership renewals are due only 1 July 2021.**

Members in credit will be notified personally of amounts due beforehand.

- Members : **R 170**
- Family Membership: **R 200** Maximum 2 members
- Cheques: **Please note NO cheques or cash will be accepted - Please pay by EFT**
- EFT: **ASSA Natal Centre**
- Bank: **Nedbank**
- Account No. **1352 027 674**
- Branch: **Nedbank Durban North**
- Code **135 226**
- Reference: **SUBS - SURNAME and FIRST NAME**
- Proof of Payment: treasurer@astronomydurban.co.za



SKY GUIDE 2021 and ASSA MASKS - Still available !!!

Sky Guides: **R 95:00** each with payment reference **SG - SURNAME and FIRST NAME**

Masks: - **R 55:00** each with payment reference **MK - SURNAME and FIRST NAME**

For Both: **R150:00** with payment reference **SM - SURNAME and FIRST NAME**

Please send your proof of payments are sent to treasurer@astronomydurban.co.za following your payment.

RESIGNATIONS from ASSA:

Please send an email immediately notifying the Secretary at secretary@astronomydurban.co.za

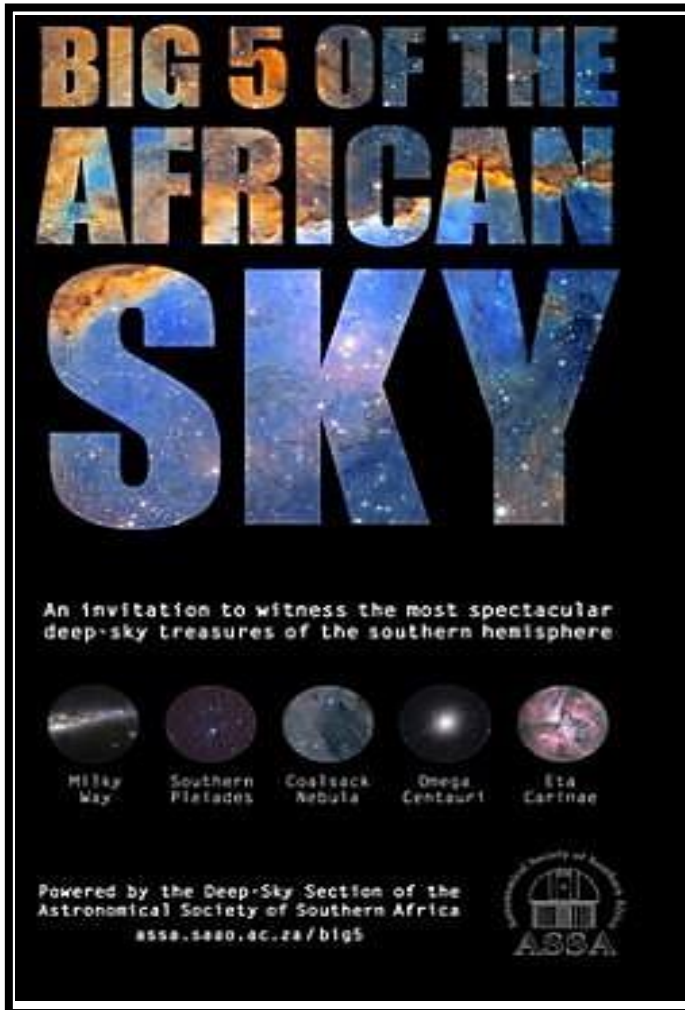
CONTACTS:

- | | | |
|--------------------------------------|-----------------|-------------------|
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| • Secretary | Clair Odhav | (+27) 83 395 5160 |
| • Treasurer | Corinne Gill | (+27) 84 777 0208 |
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| • Publicity & Librarian | Clair Odhav | (+27) 83 395 5160 |
| • Out-Reach - Public | Sheryl Venter | (+27) 82 202 2874 |
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| • 'nDaba Editor, Website & Facebook | John Gill | (+27) 83 378 8797 |

ELECTRONIC DETAILS:

- Website: www.astronomydurban.co.za
- Emails : AstronomyDurban@gmail.com
- Instagram: [astronomydurban](https://www.instagram.com/astronomydurban)
- Facebook: <https://www.facebook.com/groups/376497599210326>

THE BIG 5 OF THE AFRICAN SKY



The magnificent southern sky is a starry realm richly sown with a treasury of deep-sky objects: star clusters, bright and dark gas clouds, and galaxies.

From this (sometimes bewildering) array five specimens of each class of object have been selected by a special Deep-Sky Task Force and are presented here as the celestial Big Five.

The representative of open star clusters is the **Southern Pleiades**. First amongst the globular star clusters is the overwhelming **Omega Centauri**. Bright nebulae are represented by the majestic **Eta Carinae Nebula**. The mysterious dark nebulae are represented by the **Coal Sack**. And the most splendid galaxy of them all is our own **Milky Way Galaxy**.

Your mission is to observe each of these beautiful objects and report back on what you have witnessed.

All submitted observations will be carefully evaluated and feedback will be given.

The names of all participants will be acknowledged on the ASSA website. Observing certificates will be awarded only on merit and issued by the Deep-Sky Section of the Astronomical Society. Have fun, and keep looking up! <http://assa.saao.ac.za/sections/deep-sky/big5/honour-roll/>

Image and text from ASSA <http://assa.saao.ac.za/sections/deep-sky/big5/>

