ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

Durban ’nDaba

Monthly Newsletter of the Durban Centre - August 2022

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Member Submissions Disclaimer

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Chairman's Chatter

August 2022

Dear ASSA members.

Please accept my apologies for the late submission of the 'nDaba, I have had laptop difficulties coinciding with work commitments and this has held up the distribution of the newsletter to you all..

Following our AGM on the 13th July, I would like to begin by welcoming our newest committee members Fiona Khan (Editor), Rowena Baldew (Outreach) and Yesen Govender (Website).

Our outgoing committee members have served us all to the best of their abilities and always went above and beyond what was required of them to ensure that we maintained the highest of standards in all aspects for the ASSA Durban Centre.

I would like to thank them for their unconditional contributions as committee members. Mike Hadlow as the Observatory Directory which included coordinating the viewing evenings, Sheryl Venter who for years coordinating Outreach events, John Gill the Website Manager who created the new website, and who with his wife Corinne, produced the 'nDaba for the last 6 years, and finally to Corinne Gill, the outgoing Treasurer who never missed presenting the financial report!

At the AGM, Raymond Field, (pictured to the right) was presented with the Astronomer of the Year award. Being the longest standing member of the society, he continues today to provide the detailed "At The Eye Piece" report featured in the 'nDaba, which is to be found on page 9.

The James Webb Telescope has continued making headlines with the incredible photographs being sent back to Earth. See a write on these photographs on page 29.

Please refer to the enlightening article submitted by one of our Young Astronomers, Luke Grosvenor, who visited Sutherland and shared his incredible experience thereof on page 21.

We are still open to the creation of the youth group which is the brainchild of our former committee member Corinne Gill, which will focus on the academic side of astronomy. If you or any one know of kids between the age of 8 to 16 and would be interested in participating, please make with contact with myself or the secretary, Francois on secretary@astronomydurban.co.za.

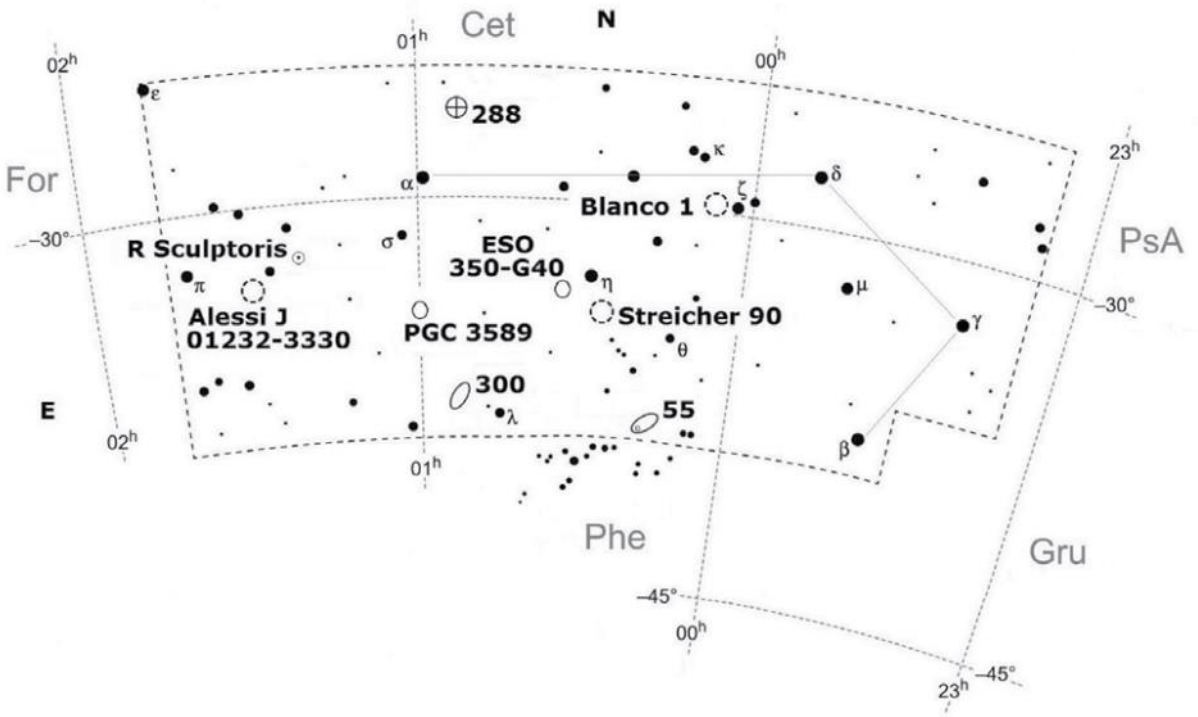
With our skies showing more cloud than clear nights as of recent, I hope that you are making the most of what is left of our winter nights.

Clear skies to you all.

Amith

Astronomy Delights: Sculptor
The Sculptor's Feast in Art

By Magda Streicher



ABOVE: The Constellation of Sculptor

ABOVE: A real masterpiece of bronze Cheetahs
in the hands of the sculptor Gill Wiles

… Astronomy Delights: Sculptor

The constellation Sculptor is situated between Cetus to the north and Phoenix to the south. The name dates back to 1754 when the astronomer Nicolas Louis de Lacaille named the constellation, the last of the 88 constellations now recognized. It was originally called “L’Atelier du Sculpteur”, (the Sculptor’s Workshop) in French. However, I like the German version “Bildhauerwerkstätte”, it just says it all.

With a bit of imagination, it is just possible to see the bowed head of a sculptor, possibly busy creating a masterpiece. What certainly is true, though, is that Sculptor contains masterpiece objects. Let us now follow the route of the chisel through the constellation, which appears faint but shows off its objects with pride.

The western part of the constellation is characterised by magnitudes 4.4 gamma, 4.3 beta and 4.5 delta. However, many of its objects described in this chapter are situated more towards the middle area of the constellation. A mere 3 degrees south-east of delta Sculptoris is **BLANCO 1**, discovered in 1949 by Victor Blanco - a very large, sparse, open cluster centred around the magnitude 5 zeta Sculptoris. This area boasts a wealth of bright stars that can yield excellent observation results with binoculars. Approximately 6 degrees further south-east is the magnitude 4.8 eta Sculptoris, very conveniently located in the central area of the constellation.

Open star clusters in this constellation are somewhat scarce, requiring me to fall back on my list of asterisms. **STREICHER 90** can be found about 2.2 degrees south of eta Sculptoris. A group of more than a handful can be picked out against the fainter star field. Six of them are evenly spaced in a north-west to south-east direction in perfect symmetry, with a further few stars to the north spoiling this shape to some extent. Most of the stars display colours that vary from buttery-yellow to orange.

RIGHT: STREICHER 90 – Photograph: DSS

LEFT: ESO 350-G40 – IMAGE: APOD-NASA

The Sculptor constellation harbours a huge number of galaxies. One of them situated 2 Degrees east of eta Sculptoris is **ESO 350-G40**, better known as the Cartwheel Galaxy, was found by Fritz Zwicky in 1941, with the second name Zwicky’s Ellipse.

… Astronomy Delights: Sculptor

This ring galaxy displays a special appearance and is around 500 000 light-years distant. Under the ideal conditions of a dark bushveld starry skies, I made a desperate attempt to glimpse this rare object. The only way was to sketch the complete star field. The galaxy could barely be seen with averted vision as a very faint, extremely small out-of-focus hazy light. A mere 6’ north is a pair of magnitude 13 stars, which most conveniently points the way, making this task slightly easier. Comparison with star-maps afterwards showed that I was right on target. But just like that perfect image chiselled out by the sculptor, this special object is distinctive which, as photographs show, forms an open wheel with a bright hub that truly justifies its name. The galaxy probably came into being as a result of a direct collision with a satellite galaxy, causing a blue ring of infant stars.

The very faint galaxy **PGC 3589** was the first dwarf galaxy to be discovered in our local group of galaxies, and situated in the south-eastern part of the constellation. Also known as The Sculptor Dwarf Galaxy, it was found by Sylvia Lindsay, working for Harlow Shapley at Boyden Observatory in South Africa at the time. At a distance of 300 000 light-years, it was possible to study the proper motion of this system quite successfully. The Sculptor Dwarf contains only 4 percent of the carbon and other heavy elements found in our own galaxy, the Milky Way, making it similar to primitive galaxies seen at the edge of the universe.

LEFT: PGC 3589 – IMAGE: phys.ttu.edu

Sculptor is home to exceptional objects and presents a surprise with the very special magnitude 6.8-star R Sculptoris. It is a scarlet carbon Mira-type star that can be seen approximately 1.5 degrees north-east of the galaxy NGC 597. With a variable period of 207 days, ranging between magnitudes 9 to 12.8, it is one of the most brilliant red coloured stars in the night sky.

RIGHT: NGC 597 IMAGE: cseligman.com

… Astronomy Delights: Sculptor

ABOVE: NGC 55 – Photograph: Dieter Willasch

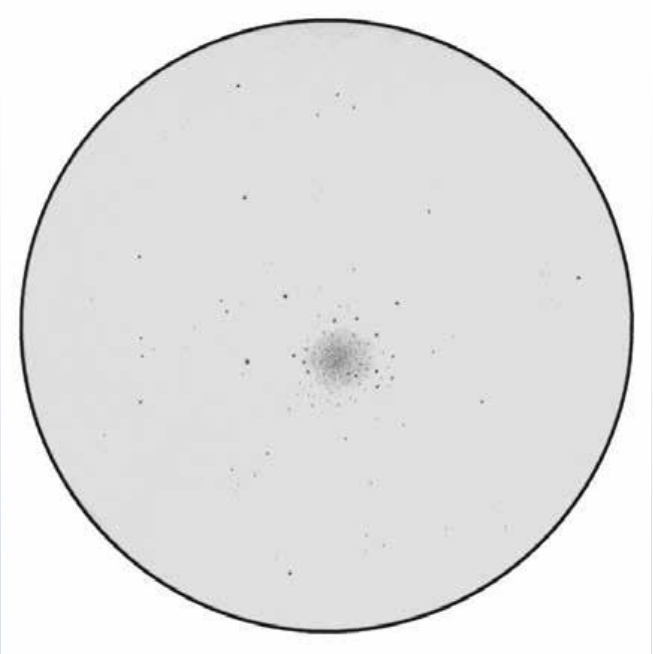
One of the most interesting galaxies can be found on the border between Sculptor and Phoenix. **NGC 55**, is a splendid edge-on galaxy with a lot of character, and very elongated in a north to south direction. The core is bright and stands out but seems to be off-center towards the north-western thicker part. A few faint stars can be seen on the hazy surface. NGC 55 shows some structure two-thirds of the way down the south-eastern part, where the galaxy tapers down and appears slightly broken off, surrounded in nebulosity. This broken part is also host to a small hazy patch which has been catalogued as IC 1537. The object gives the impression of a shuttle with its plume of smoke just off its main body. James Dunlop was fortunate enough to be the discoverer of this galaxy, which he recorded as a beautiful long nebula. I Sometimes wonder what ancient secret this exceptional galaxy harbours, slowly and leisurely creating a work of art, forming it into this unique shape.

ABOVE: NGC 300 – IMAGE: Dieter Willasch

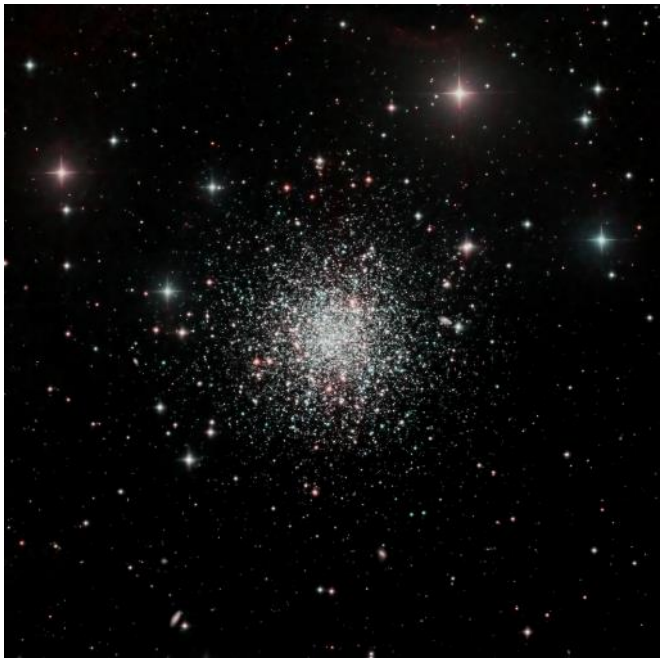
Approximately 2 degrees east from lambda Sculptoris is the open spiral galaxy **NGC 300**, also known as the Southern Pinwheel. The double star lambda Sculptoris form a lovely pair with a white magnitude 6 primary and a magnitude 5.9 yellow-coloured companion. The galaxy however displays a large, faint, round to slightly oval smudge of light in a north-west to south-east direction, growing very gradually brighter towards its relatively small nucleus. Faint stars can be glimpsed embedded on the dusty surface. Auke Slotegraaf saw this galaxy as a small cloud in his 11×80 binoculars, with a magnitude 9.5 star immersed in its northeastern Border.

Close to the eastern edge of the Sculptor constellation and 5 degrees west of the Fornax constellation, Bruno Alessi came across a lovely star grouping **ALESSI J01232-3330**, consisting of eight stars, all slightly yellowish in colour. The brightest is the magnitude 6.7-star HD 8474, which is situated towards the south.

Astronomy Delights: Sculptor



ABOVE: **NGC 288**



Globular clusters are a favourite and are very popular among observers. **NGC 288** is no exception, displays a soft, hazy glow with faint resolved stars, although it could also have the appearance of a dense, very distant faint open cluster. With higher magnification it appears as a bright ball of glittering lights, splashing out in a haze. The uneven core is not very dense, but it stands out fairly well. Brighter stars dot the outer edge of this globular, which shows off beautifully against the background star-field. This globular is about 300 000 light-years away and looks like a distant comet in small telescopes. Sculptor's claim to fame is that the southern galactic pole is less than a degree south-west of this lovely object. The well-known edge-on galaxy NGC 253, only 1.5 degrees further north was discovered by Caroline Herschel on 23 September 1783 with her 4.2-inch reflector. NGC 288 – Globular Cluster

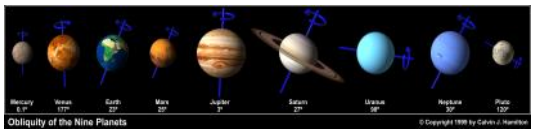
The idea is to linger unhurriedly, just like a skilled Sculptor, among the wonderful objects in this constellation, because it is the time taken during an observation that makes all the difference.

LEFT: NGC 288 - IMAGE: irida-observatory.org/ Namibia

OBJECT	TYPE	RA	DEC	MAG	SIZE
BLANCO 1	Open Cluster	00h04m.3	-29°56′.0	4.5	70′
NGC 55	Galaxy	00h14m.9	-39°11′.0	8.1	30′×6.3′
STREICHER 90	Asterism	00h27m.5	-35°17′.3	11	20′
ESO 350-G40	Galaxy	00h37m.7	-33°43′.0	12-13	1.5′×1′.2′
NGC 288	Globular Cluster	00h52m.8	-26°35′.0	8	13.8′
NGC 300	Galaxy	00h54m.9	-37°41′.0	8.1	20′×13′
PGC 3589 Sculptor System	Dwarf Galaxy	00h59m.6	-33°42′.5	11+	30′
ALESSI J 01232-3330	Asterism	01h23m.2	-33°30′.0	6.7	8′

At the Eyepiece

August 2022 by Ray Field



The Moon is first quarter on the 5th, full on the 12th, last quarter on the 19th and new on the 27th. The Moon is near Spica on the 4th, Antares on the 7th, Pluto on the 10th, Saturn on the 12th, Neptune on the 14th, Jupiter on the 15th, Uranus on the 18th, Mars and the Pleiades on the 19th, Near Pollux on the 24th, Venus on the 26th, Regulus on the 27th, Mercury on the 29th, and Spica again on the 31st.

Mercury is near Regulus on the 4th, the Moon on the 29th and Mercury is at its greatest elongation of 27° 19' on the 27th as an evening object over the West after sunset.

Venus is visible low in the morning sky this month. The beginning of the month is the best time to see it, shortly before twilight above the horizon.

Mars is visible in the morning sky before dawn over the East. It lies between the bright planets Venus and Jupiter. Mars will brighten towards the end of the year. At the moment, it is the third brightest planet in the sky. The Moon is near Mars and the Pleiades (Seven Sisters) on the 19th.

Jupiter is near the Moon on the 15th, Jupiter, the largest planet in the Solar System and its four biggest moons are visible, even in small telescopes. Jupiter rises at 20:00 at the beginning of the month and by 20:00 at the end of the month.

Saturn, the ringed planet, is at opposition on the 14th when it is visible all night. It rises at sunset and sets about sunrise. On the 12th the full Moon is near Saturn. Saturn's brightest and biggest moon, Titan is visible near the planet in a small telescope. C/2017 K2 may become visible in binoculars as it passes through Scorpius in August.

Comet C/2017 K2 may become visible in binoculars as it passes through Scorpius in August.

Meteor Showers: There are three showers with favourable prospects of observation for this month.

Name	Max	Active Dates	ZHR	Start & End	Prospects
Piscis Austrinids	29 July	19 Jul – 17 Aug	5	21:30 – 05:00	Favourable
Southern Delta Aquariids	30 July	21 Jul – 29 Aug	25	22:00 – 05:-00	Favourable
Alpha Capricornids	30 July	15 Jul – 25 Aug	5 - 10	20:00 – 04:00	Favourable

The starry sky from Durban. In the early evening, the Southern Cross has passed its highest point above the southern horizon and has started to descend towards the Southwest. Scorpius and Sagittarius aver almost overhead, whilst the brightest star, Fomalhaut, is rising in the Southeast. The bright star, Arcturus, orange in colour, is setting in the Northwest. The long arm of the Southern Cross extended, points to the little quadrilateral of Corvus the crow, near the star Spica, which is getting lower and setting over the West.

References include the ASSA Sky Guide 2022, Philips' Planisphere 35°, Stars of the Southern Skies by Sir Patrick Moore, Norton's Star Atlas and Stars of the Southern Sky by Mary Fitzgerald.

Faint Fuzzies in and Around Pegasus and Andromeda

by Joe Bergeron

ABOVE: The globular cluster M15 in the constellation Pegasus.
Image credit: Joe Bergeron.

I write this in late October. Every night, the sky is four minutes more wintry than it was the night before. For now, the sky is still dominated by the constellations most associated with Autumn, even as the Summer Triangle slides past the meridian and the Pleiades rise in the east.

The constellations of northern autumn, Pegasus and Andromeda, linger well into the winter months and offer many deep sky wonders for observers equipped with a good telescope. One recent autumn evening, as the Pleiades rose in the east, I set about looking for a handful of these sights in my 8-inch Edge HD Schmidt-Cassegrain telescope.

My first targets are found in the constellation Pegasus. First is NGC 7331, located just off the northwest corner of the Square of Pegasus, one of the more prominent galaxies that didn't make into the Messier catalog through some oversight of the observers of the 18th Century. In my 8-inch at 168x, I saw a highly elongated, reasonably bright glow. This was only the central, brightest part of the galaxy. By taking some time and using averted vision, long, faint extensions representing the galaxy's spiral arms became visible. Images reveal prominent dark lanes, but I saw none of these. Overall, NGC 7331 as seen in an 8-inch scope resembles the much closer Andromeda Galaxy as seen in a tiny 30mm finder scope. The galaxy is accompanied by a flotilla of small, faint companions, but I saw none of them, including the brightest one, NGC 7335, which lies just east of 7331 at magnitude 13.4. I was seeing stars fainter than 14th magnitude, so this absence surprised me.

…Faint Fuzzies

Half a degree to the southwest of 7331 is a notorious challenge for visual observers, Stephan's Quintet. This compact group of galaxies lies about 280 million light-years away, several times farther than most galaxies commonly observed by amateurs. One of the five, NGC 7320, shows by its redshift that it is much closer than the others, at only 39 million light-years away. It's either pretending to be a member of the Quintet, or the others are photobombing it.

How did they appear? Well, they are called a challenge for a reason. At 168x the 4 arc-minute group shimmered in and out of view, vague and hard to define, ghostly and elusive. I tried reducing the magnification to 92X, but that did nothing to enhance their visibility. I'm not sure I would have even noticed them if I hadn't been looking for them.

That observation disappointed me, because in the past I've had better views with my 155mm refractor, under skies that were no better, revealing the individual galaxies more distinctly. I guess I have to acknowledge that I'm no longer 30, or even 50 years old.

BELOW: NGC 7331 (upper right) and Stephan's Quintet (lower left) - Image credit: Joe Bergeron.

After that episode of staring into the void, I was ready for something that's not shy about revealing itself. I found it in NGC 7662, otherwise known as the Blue Snowball Nebula, across the border in Andromeda. Visible in any decent telescope, in my 8-inch this planetary nebula is a small, nearly circular ball of frosty light. Yes, it's blue, or at least bluish. Small but relatively bright objects like the 8th magnitude Snowball are intense enough to reveal colors to the telescopic observer, this effect only increases with aperture. 168x showed the nebula's annular nature with a darker center. This was more obvious at 287x. At that power those inner parts hinted at the navy blue color I find typical of the interiors of ring-like planetaries.

…Faint Fuzzies

The central star, a white dwarf with the extremely high temperature of around 200,000 K, is faint, and is stated to be variable over a range of magnitude12-16, with a period of 27 days. I thought I glimpsed it a few times, which is likely only if it was around magnitude 12, as the glow of the nebula would swamp anything much fainter.

It seemed unlikely that a white dwarf could be variable over such a wide range. With a little help from my friends, I found that the only account of its variability comes from the visual observations of astronomer Edward Emerson Barnard, using the 40-inch refractor at Yerkes Observatory around the turn of the 20th Century. As far as I can tell, no one has reported that variability since. It's possible that Barnard was fooled by varying seeing conditions at Yerkes. On a night of bad seeing, the star could be diffused into invisibility.

If the star really is variable, the effect could be caused by orbiting material that periodically shades it from our point of view. If the star is intrinsically variable, I wonder if a time-lapse movie would reveal ripples of light and darkness radiating through the nebula as the central star changes in brightness. Regardless of all that speculation, a magnitude 13 star lies just east of the nebula, and can be seen in a 6 to 8-inch scope.

If Omega Centauri and 47 Tucanae are Grade A globular star clusters (and they are), then the likes of M13 and M22 are Grade B, though we Northerners hate to admit it. A bit below them are the Grade C globulars, still respectable, solid supporting players among deep-sky objects.

A great example of these is M15 in Pegasus, lying off the starry nose of the upside-down flying horse, which we call Enif, or Epsilon Pegasi. This is an impressive object at 168x, very well resolved, with at least 50 or 60 12th magnitude stars that are obvious enough to plot in a drawing (if you could keep track of them all), and of course a mass of stars fainter and more fleeting, brightening to an intense and concentrated core. This bright, compact core (as well as X-ray emissions) hints that a black hole may exist at the center of this swarm.

ABOVE: M15 - Image credit NASA & ESA

If you drop about ten degrees south from M15, crossing into Aquarius, you will encounter a globular cluster of similar brightness but different character, M2. Looking more powdery than starry, the individual stars of M2 are about a magnitude fainter than those of M15, and show less central concentration. Instead, M2 presents a round disk of massed stars, with brightness pretty uniform across it. This fades to a less populated halo where the individual stars are easier to pick out. This cluster would be harder to resolve in a 4 or 5 -inch telescope. Do you think that if you've seen one ball of a hundred thousand stars, you've seen them all? Comparing these two is a good rebuttal to the notion that globular clusters are pretty interchangeable.

Moving now from the sublime to the ridiculous, recently I've been imaging some huge but faint nebulae in the northern sky, with spectacular results. I decided to see if I could see any trace of them of them in my eyepiece. The answer was: not really, no.

…Faint Fuzzies

First I tried the so-called Cave Nebula, Sharpless 2-155, in Cepheus. Using my lowest available power of 58x, with a field of 1.2 degrees, this star field revealed nothing but a vague suspicion that the entire field looked slightly hazy. Wanting to give this thing a fair evaluation, I added an Ultra High Contrast filter to the eyepiece, which did not help at all. Despite its presence on a popular observing list, I believe the Cave is essentially impossible to observe in any telescope. The Cave nickname seems most appropriate if you consider it describes the completely lightless interior of a cave.

ABOVE: The Cave Nebulae - Credit: Planewave

I was tempted to declare the Cave unobservable, but observer Mel Bartels and others report difficult observations of the brightest, curved section of the nebula, mostly with scopes bigger than mine. So, don't take my word for it. Point you own scope at it and see (or don't see) for yourself.

From there I tried the sprawling Soul Nebula and then the Elephant Trunk Nebula, in Cassiopeia and Cepheus respectively, with even more dismal results, seeing or suspecting nothing at all, despite a careful search. These objects attest to the amazing power available to amateurs with CCD or CMOS cameras and image processing software.

ABOVE: The Iris Nebula, NGC 7023, in the constellation Cepheus. Image credit: Joe Bergeron.

Finally I tried the Iris Nebula, NGC 7023, in Cepheus. I had the highest hopes for this object, as it was the only one of the lot to show any nebulosity in the raw frames I shot of it. I peeked in the eyepiece at 92x and Behold! I actually saw something! Surrounding a bright 7th magnitude star was a vague but definite glow, irregular in averted vision, but not seen clearly enough to pin down any definite shape, by me at least. That bright star interferes with observing the nebula, but it also makes it possible to observe anything at all, as the star is what illuminates the nebula in the first place. Being a reflection nebula, using a UHC or other narrow-band filter is counterproductive.

I've always thought that faint diffuse nebulae are the toughest class of object for visual observers. Give me a 2 arc-second 12th magnitude planetary nebula and I'll probably spot it. But a 2-degree expanse of Hydrogen Alpha emission? It will probably leave me scratching my head.

Cover Image - The Lobster Nebula

Image by Gerald de Beer

NGC 6357 is a diffuse nebula near NGC 6334 in the constellation Scorpius. The nebula contains many proto-stars shielded by dark discs of gas, and young stars wrapped in expanding "cocoons" or expanding gases surrounding these small stars. It is also known as the Lobster Nebula. This nebula was given the name War and Peace Nebula by the Midcourse Space Experiment scientists because of its appearance, which, in infrared images the bright, western part resembles a dove, while the eastern part looks like a skull. [Wikipedia]

I have processed this in the false colour HSO pallet with RGB stars.

Captured 28 Jun 2022 and 29 Jun 2022

Tech Specs:

Filters

Red : 20x45" (15') (gain: 100.00) -10°C bin 1x1

Blue : 20x45" (15') (gain: 100.00) -10°C bin 1x1

Green : 20x45" (15') (gain: 100.00) -10°C bin 1x1

Ha : 30x300" (2h 30') (gain: 100.00) -10°C bin 1x1

S-II : 30x300" (2h 30') (gain: 100.00) -10°C bin 1x1

O-III : 30x300" (2h 30') (gain: 100.00) -10°C bin 1x1

Integration Time

8h 15' hours

Equipment

ZWO ASI2600MM Pro cooled mono camera

Skywatcher EQ6-R Pro mount

AT126EDT triplet telescope

Software

N.I.N.A.

PixInsight

Index Image:

A Starry sky and the Milky way arc, showing details of it’s colorful core and outstanding brightness which was captured from the Namib desert in Namibia, Africa. The small Magellanic Cloud can be seen on the left hand side.
Source: Stock photo thumbnail

Astronomy in Medieval Islam

By Ahab Bdaiwi

What lies beyond what is known? Who is responsible for the majesty of the stars? Since the revelation of Islam, the night sky has offered philosophers and theologians alike a window into understanding God, heaven, and our unique journey to salvation.

Social media users rarely if ever agree on anything.

As an active Twitter poster, I can testify first-hand that cyberspace is, most of the time, a cesspit of interminable disagreements and vexatious quarrelling.

Every now and then, however, users find common ground, a happening that brings them together, at least temporarily. The most recent unifier came after NASA published the first images of the James Webb Telescope.

Everyone was taken aback by the never seen before and breathtakingly beautiful photographs of deep space.

"To the medieval Muslim astronomers and scientists, the heavens provided a heady language of admiration and thoughtful reflection. Numerous verses in the Quran, the earliest surviving text from early Islam, instruct believers to ponder over the signs of God scattered all over the heavens"

Few today would disagree that there is something mystifying and humbling about the heavens and the starry night sky.

Like us, our ancient predecessors found much delight in their nocturnal sky gazing. But for ancient religionists and scientists, there was more to it than sheer curiosity and admiration.

To stare at the heavens was to communicate with the gods and reach into the realm of metaphysics. The practice belonged to astrology and good-natured magic.

...Astronomy in Medieval Islam

ABOVE: NGC 3324 in the Carina nebula - Image credit: Nasa/Getty Images

We are told as much in the ancient Greek novel *Aethiopica* by Heliodorus. When the Egyptian priest admonishes the young Theagenes, he informs him that to study the heavens is to tread the path of wisdom and honesty:

There is a vulgar science and one which, I might say, crawls on the surface of this earth… The other, my son, is truly wise, of which the vulgar form is an illegitimate version masquerading under the same name… It is conversant with heavenly things, lives with the gods, and partakes of the higher nature, considering the moving of the stars and gaining a knowledge of the future therefrom, far removed from these earthly evils and directing all things to the honesty and commodity of men.

Fast forward several centuries into the world of Islam and you will find similar sentiment.

To the medieval Muslim astronomers and scientists, the heavens provided a heady language of admiration and thoughtful reflection.

Numerous verses in the Quran, the earliest surviving text from early Islam, instruct believers to ponder over the signs of God scattered all over the heavens, expressed in several places in the Muslim scripture, as the following verses show:

Verily in the heavens and the earth are signs for those who believe (45:3).

He causes the dawn to break, and has made the night for rest, and made the sun and the moon to travel with precision. That is the design of the Almighty, All-Knowing. And He is the One Who has made the stars as your guide through the darkness of land and sea. We have already made the signs clear for people who know (6.97-8).

He is the Lord of the heavens and the earth and everything in between, and the Lord of all points of sunrise. Indeed, We have adorned the lowest heaven with the stars for decoration (37:5-6)

...Astronomy in Medieval Islam

Later generations of Muslim thinkers went a step further. They came up with ingenious ways to study and reflect on the heavens.

They built observatories that helped them discover constellations and distant stars – that is why most of the present-day constellations bear Arabic names, such as a Acrab, Caph, Furud, Lesath, Maaz, Thuban, and Zurac – devised instruments to map out the night sky, penned treatises on celestial and longitudinal movements, put forward arguments for a spherical earth and heliocentric planetary model, and paid significant attention to the sun and moon to arrive at precise descriptions of lunar and solar eclipses, among many other things.

Let us consider some notable examples. As early as the ninth century CE Muslims constructed observational posts and built observatories.

Two observatories were founded during the reign of the Abbasid caliph al-Maʾmun (r. 813-833): the Shammasiyyah, in Baghdad, and the Qasiyun, in Damascus.

ABOVE: Folio of Qur'an 45:3ff, Forschungsbibliothek Gotha - Image: Corpus Corancium

They operated as solar and lunar observational posts, resulting in a set of planetary tables, longitudinal movements, and astronomical handbooks, known as the Mumtahan Zij.

It was during research conducted at the Shammasiyyah Observatory in Baghdad that the Persian Muslim scientist Habash al-Hasib (who died in 869 CE) calculated the circumferences, diameters, radii, and other matters related to the Earth, Sun, and the Moon.

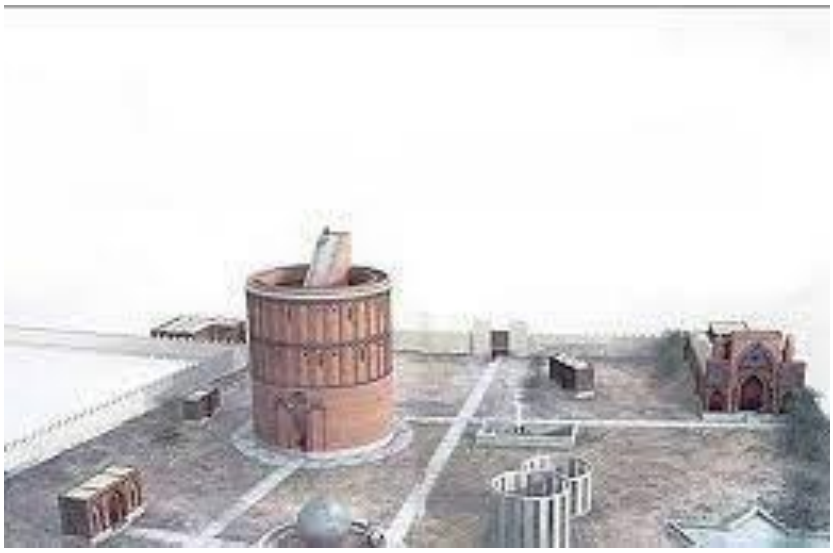
His findings, published in his "The Book of Bodies and Distances" are remarkably close to modern science. Al-Hasib calculated the Earth's circumference to be 32,444 km (modern science says 40,000 km) and the Moon's circumference 9538 km (modern science says 10921 km). His calculations of the Sun's circumference, however, were quite wide off the mark.

...Astronomy in Medieval Islam

LEFT: Nasir al-Din al-Tusi and students working at the Maraghah Observatory - Image: Wikimedia

In the subsequent centuries, Muslims went on to build another seven observatories. Among the most notable were the Maraghah and the Samarqand observatories.

BELOW:: The Maraghah Observatory was constructed in 1259 CE in what is today the East Azerbaijan Province of Iran.



It was designed by the formidable philosopher, theologian, and mathematician Nasir al-Din al-Tusi (who died in 1274). It functioned as a centre for astronomical research, housing a library, equipment storage, and several circular observational posts to observe stars and planetary objects.

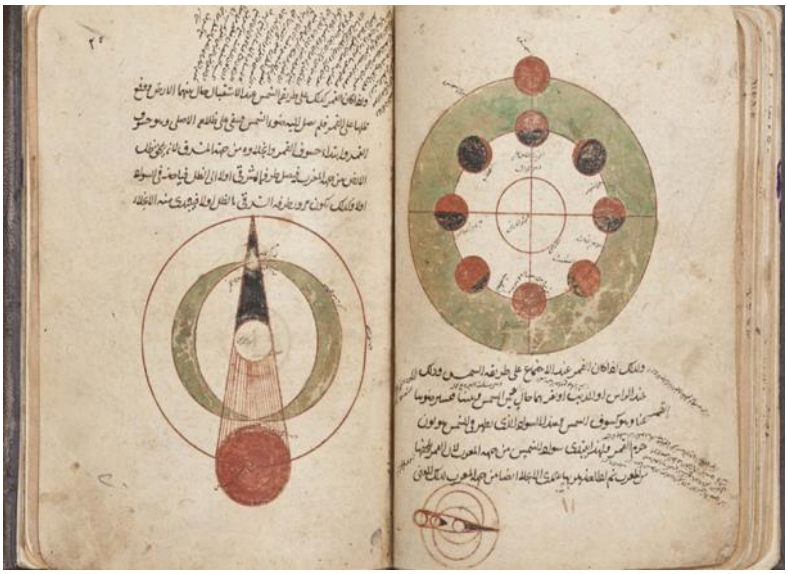
Right: The Samarqand Observatory was built in the 1420s CE by the erudite mathematician and astronomer Ulugh Beg (who died in 1449). It took inspiration from the Maraghah model while relying on the scholarly insights of Ulugh Beg in trigonometry and spherical geometry.

"Owing to the many commentaries on the heavens and the marvels of the universe, it appears that medieval Muslim societies became assiduously invested in understanding the great wonders of the stars and deep space".

Eager to develop their observational activities, medieval Muslim astronomers took a keen interest in what we might today call cosmography. The Epitome of Introductory Theoretical Astronomy is but one glaring example.

It was written by the thirteenth century CE astronomer and physician Mahmud al-Jaghmini. The work is in Arabic, and it contains introductory explanations on how celestial movements work, along with discussions on the nature of bodies and, more specifically, the Earth.

...Astronomy in Medieval Islam



LEFT: A copy of the Epitome of al-Jaghmini - Image: Al-Khalil Collection of Islamic Art

Undoubtedly popular, owing to the numerous commentaries it received in Arabic and Persian (and by the plethora of extant manuscripts of the work), the work typifies a medieval example of public-facing scholarship aimed at educating the laity and astronomy enthusiasts.

In fact, owing to the many commentaries on the heavens and the marvels of the universe, it appears that medieval Muslim societies became assiduously invested in understanding the great wonders of the stars and deep space.

A representative example of a new genre devoted to such understanding is the aptly titled *The Wonders of Creatures and the Marvels of Creation* by Abu Yahya Zakariyah al-Qazwini (died in 1283 CE).

RIGHT: A folio from the Wonders of Creation of al-Qazwini - Credit: Qatar National Library

Immensely popular, the work contains scores of detailed drawings of planets and well over 400 miniature paintings. It follows a neat hierarchical order of the cosmos, including celestial spheres, the 12 signs of the Zodiac, stellar constellations, and observable celestial phenomena, such as eclipses.

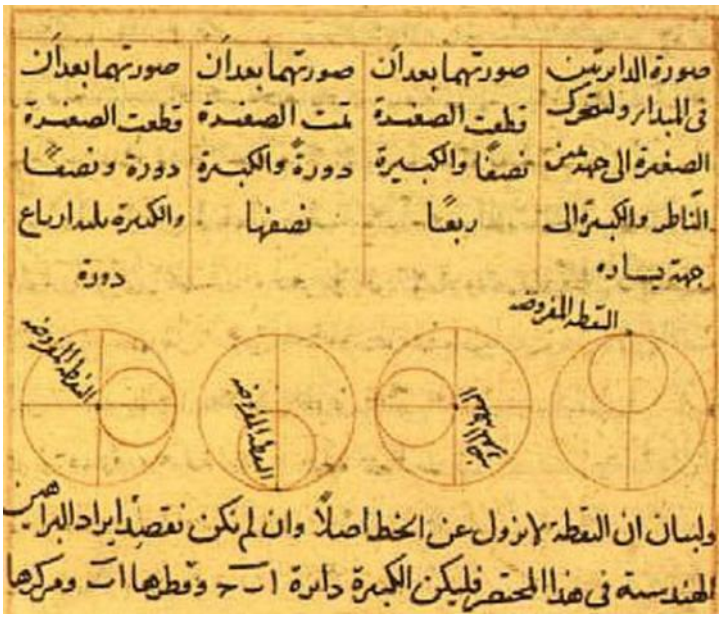
Straddling between the rational and the imaginative, al-Qazwini demonstrates fecund creative abilities in the sections on celestial cosmology. These include discussions of time and space, angels and demons, and the realm of divinity.

Steering away from the imaginative and more towards the scientific, medieval Muslims laboured hard to come up with means to measure and observe celestial happenings in the vast night sky.

Theoretical innovations included the Tusi-Couple, named after the aforementioned Tusi. It was a mathematical device containing a small circle undergoing rotary motion inside a larger circle, known as a 2-cusped hypocycloid.

...Astronomy in Medieval Islam

According to contemporary authorities of Arabic science, such as George Saliba, the Tusi-Couple provided a “solution for the latitudinal motion of the inferior planets and later used extensively as a substitute for the equant introduced over a thousand years earlier in Ptolemy's Almagest”, a celebrated work of ancient astronomy.



It was a disciple of Tusi named Muʾayyad al-Din al-ʿUrdi, who died in 1266 CE and hailed from Syria, that left an indelible mark on Arabic science by becoming arguably the most celebrated instrument maker in medieval Islamic astronomy.

Al-ʿUrdi wrote a text called “*Treatise on Observations”* devoted to the engineering of equipment required in observational posts, some of which were unique inventions by al-ʿUrdi himself.

LEFT: A medieval diagram of the Tusi Couple - Credit: Biblioteca Apostolica Vaticana

"Muʾayyad al-Din al-ʿUrdi, who died in 1266 CE and hailed from Syria, left an indelible mark on Arabic science by becoming arguably the most celebrated instrument maker in medieval Islamic astronomy".

Every observational post, we are told, requires the following instruments, as summarised by Petra G. Schmidl: a mural quadrant for altitudes, an armillary sphere for ecliptic longitude and latitude, a solstitial armilla for the obliquity of the ecliptic, an equinoctial armilla to work out the entry of the Sun into the equatorial plane and it’s path at the equinoxes, and a dioptrical ruler to measure the apparent diameter of the Sun and the Moon, and what is known as the azimuth ring to determine the altitude.

These are but a few representative examples to highlight the medieval Muslim innovations in astronomy. Much more could be said of other major astronomers whose contributions are too vast to recollect in a few words.

These would include the profound studies of the eleventh century CE genius Abu Rayhan al-Biruni, arguably the greatest polymath in the history of Islam, and who argued for heliocentrism and the Earth rotating around its axis, as well as be one of the first to break down the hour sexagesimally into minutes, seconds, thirds, and fourths.

Dr Ahab Bdaiwi is University Lecturer in Arabic and Medieval Philosophy and Late Antique Intellectual History at Leiden University. His research ventures into an array of subjects and themes in Islamic studies but oftentimes revolves around the disciplines of intellectual and religious history, philosophy, theology, and oriental manuscripts in Islamicate societies.

Source: https://english.alaraby.co.uk/features/staring-heavens-astronomy-medieval-islam

Many thanks to Fiona Khan for forwarding this article through for the ‘nDaba.

Visiting Sutherland - July 2022

Luke Grosvenor (10)

We went on a family road trip to Sutherland these July holidays, although we were only there for two days, we saw and learnt a lot. Our first stop was to the Planetarium where we lay back in reclining chairs and watched a movie on the discovery of the stars. It was interesting, but the extremely fun things were still to come.

That evening, we went to Sterland, where Jurg Wagener first gave us a lecture in his indoor auditorium. He pointed out various constellations, including Scorpio which he would show us later in the night sky. After the lecture we were divided into five groups, with each group assigned a telescope. It was the first night of the Thunder moon so the sky was very bright. This made seeing stars a bit difficult but Jurg managed to find some excellent viewings for us.

First Jurg programmed each telescope to focus on Antares, the heart of Scorpio. This is a dying red star but it appeared yellow through the telescope. Young stars are hot and blue whereas older dying stars are yellow to red. Next Jurg pointed out the Southern Cross and explained how the bottom star leads to the South Celestial Point, around which all stars pivot. He focused the telescopes on the Jewel Box cluster, to the left of the Southern Cross. We could see a line of three different coloured stars – yellow, blue and red. It was absolutely beautiful.

Our next viewing was Alpha Centauri and Alpha Centauri B. These two stars appear as one to our naked eyes. It is only when you view them through the telescope that you can see it is actually two stars which orbit each other. Finally, we focused on the big yellow full moon. We could see individual craters and it was so bright that when others in our group were viewing it, we could see the light coming through the telescope onto their face. Jurg is a very knowledgeable man who passionately shared his enthusiasm for the stars with us. We were outside for about an hour but all of us were completely frozen by the time the viewing finished. After all, Sutherland is the coldest place in South Africa. At 1550 meters above sea level, it is high, dry and perfect for stargazing.

On our second day, we visited the South African Astronomical Observatory, which lies 15km outside of Sutherland, on top of a hill. There are 22 telescopes operating here, the largest being Southern African Large Telescope (SALT). Only 3 are physically manned, the rest are operated remotely by the countries who own them eg: Japan, German, Poland, UK, Korea and the US. Apart from SALT (at 11m) the scopes ranged in size between 1 – 1.9m.

...Visiting Sutherland

We visited the Elizabeth, the 1m telescope which was been in operating since 1964. It was originally housed at the observatory in Cape Town and moved to Sutherland when Cape Town's light pollution became too much. RIGHT: Luke standing beneath The Elizabeth.

They had to use the finder-scope and then manually position the telescope as fast as possible before the object moved. No heaters, hot water bottle or even a hot cup of coffee, was allowed in the room as this would cause condensation on the mirror. We were standing there during the day and the temperature was only 8 degrees. I can't imagine how cold it would be to work with the telescope at night.

The highlight of the whole trip was going inside the SALT and seeing the very impressive 11 meter-wide mirror. It is made up of 91 mirrors, each weighing 100kgs. They were designed in Russia, produced in USA and shipped to South Africa. To make sure the mirrors did not break on their trip to Sutherland, 120km of road had to be tarred. Each mirror gets cleaned and re-coated once a year. Unfortunately, the factory where they were made has now closed and so replacement mirrors are not available. To make sure that there is no condensation on the mirrors, the room is air conditioned to the estimated outside temperature at sunset. Two hours before sunset, the vents are opened to let in the outside air so that by the time the roof is opened, the inside temperature is the same as the outside. No people are allowed in the room as body heat could impact the very sensitive mirrors. At the same time that the vents are opened, the UV lights are switched off to allow the room to be clear of all UV rays by nightfall.

When SALT was first build, South Africa owned about 1/3. Other countries involved Germany, India, New Zealand, Poland, UK and USA. Since then, we have bought more of the shares and we now own 52%. The amount of ownership translates into the amount of viewing time each country has on the scope. At the moment, SALT is the largest telescope in the southern hemisphere but there is a new telescope being built in Chile. This one will have a staggering 602 mirrors.

LEFT: Luke standing next to a model of SALT

On our last night in Sutherland, with a great amount of difficulty, I pointed my scope at Saturn and I could just make out the rings. Given that the moon was still shining brightly, I was very happy with this sighting. I had been looking forward to going to Sutherland and it did not disappoint me at all. I will definitely be going back again for some more.

LEFT: Comical sign Luke saw at the viewing room of SALT

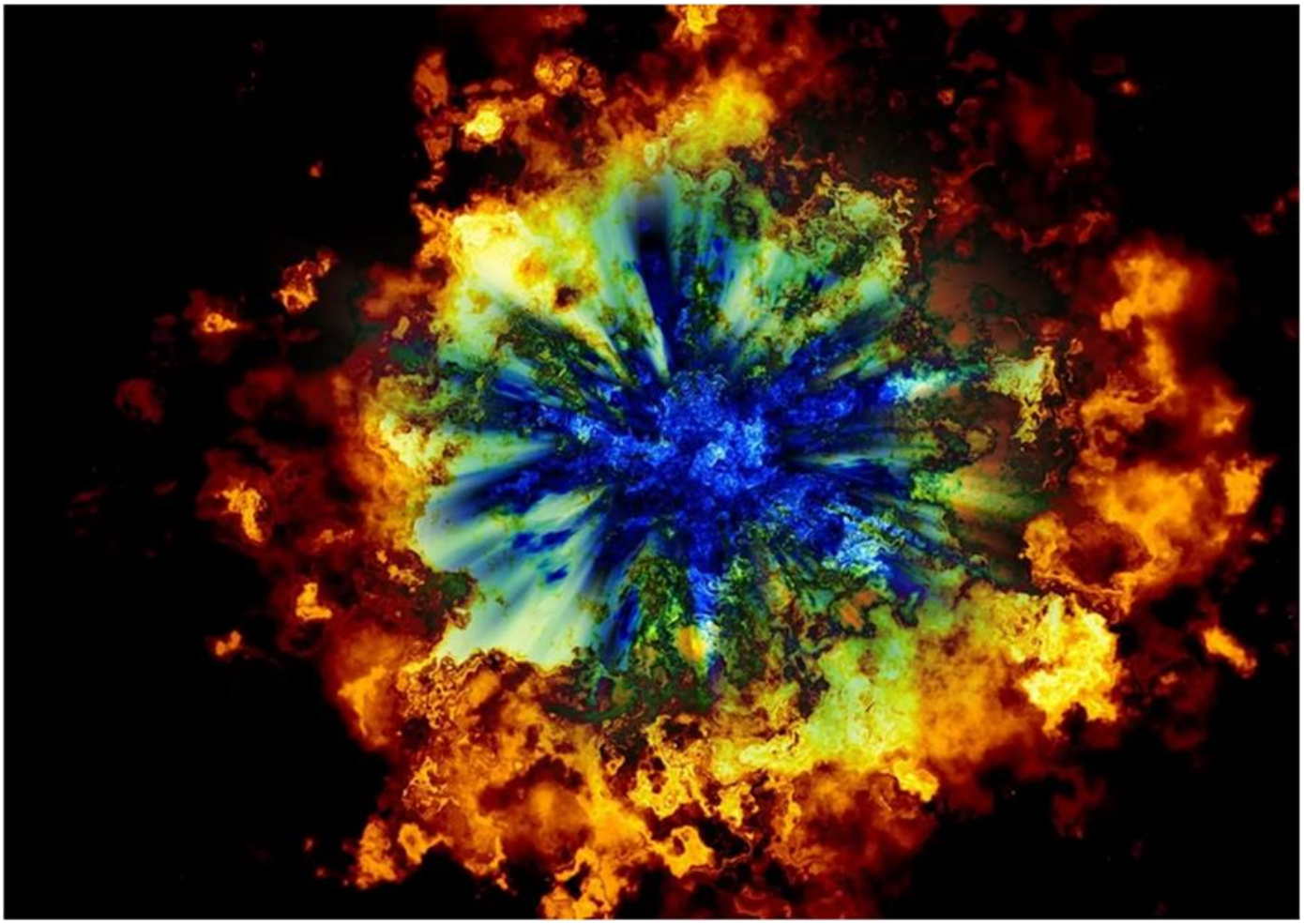
Luke Grosvenor - aged 10

The Editor would like to thank Luke for his contribution to the newsletter on his trip to Sutherland and to his mother Helen, who suppled the images.

Red Shift, Big Bang and the James Webb Telescope

By Scott Foster

American scientist and Resonance Theory creator Mark Anderson provides an alternative view of the origin of the universe.



ABOVE: Did the Big Bang happen? Doubts grow, but here's one conception of what it would have looked like. Image: Pixiebay

This described the science, technology and history behind the fantastic images delivered by the James Webb Space Telescope. This second and concluding installment considers the theories attempting to explain what we are seeing in those images.

As lauded by NASA, the telescope represents “a giant leap forward in our quest to understand the Universe and our origins.” The Webb “will examine every phase of cosmic history: from the first luminous glows after the Big Bang to the formation of galaxies, stars, and planets to the evolution of our own solar system.”

It is, says NASA, the “scientific successor” to the Hubble Space Telescope: “Hubble’s science pushed us to look to longer wavelengths to ‘go beyond’ what Hubble has already done. In particular, more distant objects are more highly red-shifted, and their light is pushed from the UV and optical into the near-infrared. Thus observations of these distant objects (like the first galaxies formed in the Universe, for example) require an infrared telescope.”

Big Bang and Hubble

The Hubble telescope is named for American astronomer Edwin Hubble. As noted in “Red shift and Hubble’s law,” published on the NASA Starchild educational site:

...Red Shift

“in 1929, Edwin Hubble announced that almost all galaxies appeared to be moving away from us. In fact, he found that the universe was expanding – with all of the galaxies moving away from each other. This phenomenon was observed as a red shift of a galaxy’s spectrum. This red shift appeared to be larger for faint, presumably farther, galaxies. Hence, the farther a galaxy, the faster it is receding from Earth…

The velocity of a galaxy could be expressed mathematically as v = H x d, where v is the galaxy’s radial outward velocity, d is the galaxy’s distance from Earth, and H is the constant of proportionality called the Hubble constant…

So to determine an object’s distance, we only need to know its velocity. Velocity is measurable thanks to the Doppler shift. By taking the spectrum of a distant object, such as a galaxy, astronomers can see a shift in the lines of its spectrum and from this shift determine its velocity. Putting this velocity into the Hubble equation, they determine the distance. Note that this method of determining distances is based on observation (the shift in the spectrum) and on a theory (Hubble’s Law). If the theory is not correct, the distances determined in this way are all nonsense. Most astronomers believe that Hubble’s Law does, however, hold true for a large range of distances in the universe.”

LEFT: Edwin Hubble. Right: Milton Humason, who worked with him on developing Hubble’s Law. Photo: ESA/Hubble

The “red shift” is key to the theory of the Big Bang, which posits that our universe originated in a huge explosion from a single point. Belgian physicist and astronomer Georges Lemaitre in 1927 called this point the “primeval atom.”

Subsequent measurements based on Lemaitre’s and Hubble’s work eventually put the age of the universe at 13.8 billion years (the figure that part 1 of this essay quoted current NASA Administrator Bill Nelson as affirming).

Controversial at first (Einstein disagreed with Lemaitre), Big Bang theory eventually became a widely held, almost consensus view of how the universe was formed.

Resonance Theory and Mark Anderson

Mark R Anderson, an independent American scientist and creator of Resonance Theory, has different ideas.

Anderson is co-founder, chairman and CEO of Pattern Computer. He and the firm were recently awarded the Alexandra J Noble Award for Scientific Discovery, and Pattern Computer has been called “the best machine learning company on the planet” by Lawrence Berkeley National Labs.

He also serves on the Advisory Boards of the California Institute of Telecommunications and IT (Calit2) at UC San Diego and of the Institute for Data-intensive Research in Astrophysics & Cosmology (DiRAC) at the University of Washington.

...Red Shift

Anderson spoke with Asia Times on the phone and sent us comments, including some of his previous writings, by email. In his own words:
“Created by Mark R. Anderson in 1979, using pattern recognition and centered on light and the conservation laws, Resonance Theory demonstrated that space was not empty, had well-understood physical characteristics, and that the laws of physics derived directly from the physical properties of space. In this sense, it both pre-dated and went beyond string theory in suggesting that particles are resonant vibrations of space itself.

Resonance Theory suggests that the red shift of distant stars and galaxies, until now taken to be purely due to the distance correlation of the Hubble Red Shift, should be understood as combining this Doppler effect with a second and perhaps larger effect of space itself subtracting energy from light over distance. This leads to the conclusions that a) there is no longer a need for the Big Bang, b) new distances calculated will be shorter, and c) all Doppler (Hubble) calculations now have to be reviewed. Do they have any contribution at all, or just a smaller one?”

In an essay entitled “Resonance Theory: Reinterpreting the Cosmos,” published in October 2021, Anderson wrote: “Most people are familiar with the downward Doppler shift of sound as a train whistle passes an observer. The same is the case for light: the emission lines of light given off by hydrogen atoms – for instance, in distant stars – are is shifted down when the stars are moving away from us.

In the Big Bang theory of how the universe began, the idea is that as we look at stars, they have a red shift based on their speed away from us. Moreover, this shift increases with their distance, supposedly indicating that the expansion of the universe is accelerating with distance from us.

Pretty Earth-centric, it seems. Of course, there are today all kinds of maneuvers that make it seem like this is not the case, or, at best, that it makes some kind of sense.”

Suffice it to say that this is the Bible, the Standard Model.

It is equally important to note that when astronomers look at the sky, they tend to see heavenly bodies embedded in emptiness. Sure, there are dust clouds, gravity lenses, all kinds of collisions and events, but we’re talking about billiard balls hung in empty space. Space itself is a void.

Not according to Resonance Theory.

What if – I asked – the explanation for these observations was that the stars are indeed in the same grouping, but since we know empty space is not empty at all, but has pronounced and definable physical characteristics (permittivity, permeability, mass), the variance in red shifts per star is caused instead by different densities of space between us and each star (or galaxy)?

In other words, since space is not empty, maybe variable density of space itself explains an important part of the Hubble red shift. No one is doubting that the Doppler effect is real, but neither does anyone really know much about star distances, except by applying Hubble’s red shift.

Beginning with the Resonance understanding that light, electrons, protons … are made of resonant vibrations of space itself, we now can look at the cosmos with new eyes, seeing something completely inverted. Rather than bodies embedded in a void, we see nothing but space -stuff, presented in different ways: light, matter, antimatter, dark matter, dark energy. There is no void only bright spots where long-term vibrations have built up into structures like electrons, planets, stars, galaxies, black holes.

...Red Shift

To say that 95% of the universe is dark is like saying that 95% of a pond does not have ripples at the moment. It happens, but it certainly is not amazing. It's normal."

ABOVE: Mark R Anderson in a file photo. Image: Amazon

Anderson continues: " So, what are the primary beliefs based upon the Hubble red-shift interpretations, and therefore available for reinterpretation? Here are a few:

- Distances measured to glowing celestial bodies are in direct correlation to their red shifts.
- The greater this shift, the farther from the observer, and the faster these bodies are moving away.
- The Big Bang theory.
- The age of the universe.
- The size of the universe.

What forces, then, drive the universe's dynamics? Let's quickly take these in order:

- In our Resonance-driven interpretation, understanding that space is not empty…, we must be open to the suggestion that any red-shift value is the combination of both a Doppler effect shift and a shift caused by the passage of light (e-m radiation) through space itself. In other words, interaction with space itself, depending upon both the Doppler shift and the density and distance of that space between the observer and the object, provides the overall red-shift data gathered over the last century.
- Given the above, we now must replace the ideas of direct distance correlation with correlation with speed, plus the variation in spatial density times the length of the path.

...Red Shift

- If we no longer can trust that the universe is expanding at prior rates, or even at all, but rather that those observations may be the direct result of path distance and variation in spatial density, then we must, at the least, forego the conclusion that there was a Big Bang that began a process we now find to be dubious.
- As a correlative of the above finding, we must also question interpretations of the age of the universe, which themselves were drawn largely from the same scenario, fed by Hubble red shifts.
- As a similar correlative, we can no longer be sure of distance calculations to heavenly bodies, since it is no longer a simple and direct Hubble red-shift correlation. At the very least, even without spatial density variation, we will have to calculate the contribution of the spatial constant density along the path of observation and its separate contribution to the red shift. It would appear that, from this perspective, it is perhaps true that all current distances for heavenly bodies are equal to, or less than, those held before."

ABOVE: Another conception of the Big Bang, this one by Cedric Sorel. Photo: Wikimedia Commons

Other doubters

Anderson is by no means the only one with doubts about the Big Bang.

British astrophysicist Fred Hoyle of the Institute of Astronomy at Cambridge, who coined the term in 1950, didn't believe in it.

In 1980, the eloquent Carl Sagan – astrophysicist, professor of astronomy and space sciences at Cornell University, and prolific speaker and author – said: "If the general picture of an expanding universe and a Big Bang is correct, we must then confront still more difficult questions. What were conditions like at the time of the Big Bang? What happened before that? Was there a tiny universe, devoid of all matter, and then the matter suddenly created from nothing? How does that happen?"

...Red Shift

Alan Guth, professor of physics at MIT, put it more succinctly in an interview in 2014: “ The Big Bang theory says nothing about what banged, why it banged, or what happened before it banged.“

American physicist Eric J Lerner elaborated on the subject in an interview with Jonathan Tennenbaum published by Asia Times in November 2020 (“The Big Bang never happened but fusion will”).

ABOVE: Eric Lerner hard at work on his nuclear fusion venture at LLP Fusion. Photo: LLP Fusion

Mark Anderson quotes an unnamed NASA scientist as saying: “We have come to have deep, deep doubts about the Hubble red shift. And there’s something like 200 theories now that are alternative theories for the Hubble red shift. It is in deep jeopardy.”

Beyond the red shift, it now looks like we are headed for a paradigm shift.

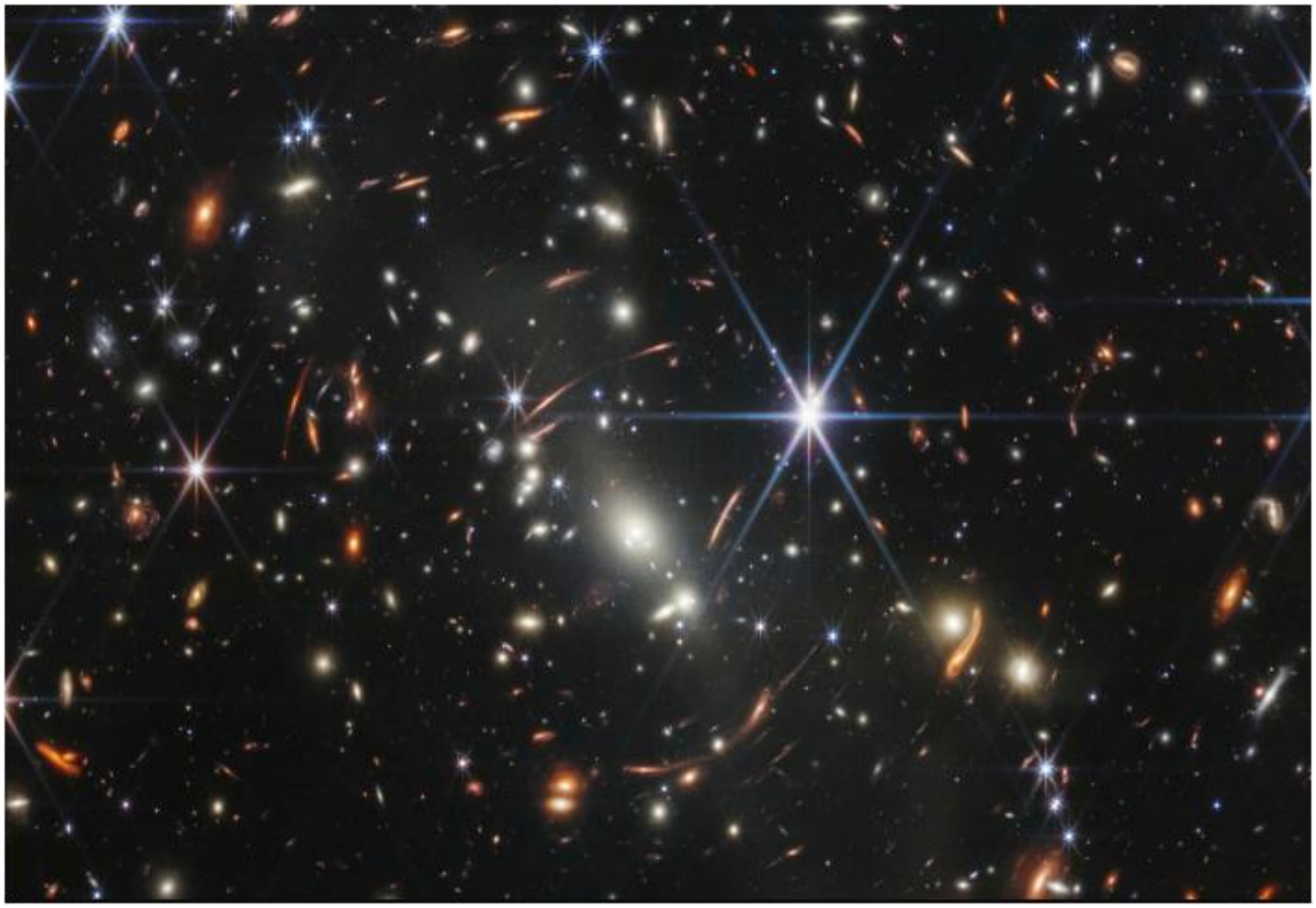
But no matter what view prevails in the years ahead, the Webb telescope is likely to make a major contribution to our understanding of the universe. As Anderson says:

The Webb Telescope should provide us with the best measurements of red shift ever done. Combined with new abilities to look further, we should be able to see – and better discern – the two contributors that we now expect explain red shifts: the Doppler or Hubble, and the energy loss per light year as light moves through space.

The real excitement, from this perspective, is getting very new and very different numbers for expansion, size, age and, of course, dark energy and matter. Both of the latter, in Resonance Theory, are just space itself.

https://asiatimes.com/2022/07/red-shift-big-bang-and-the-james-webb-telescope/

James Webb Telescope Photos



ABOVE: NASA’s James Webb Space Telescope delivered the deepest and sharpest infrared image of the distant universe so far. Webb’s first deep field is galaxy cluster SMACS 0723, and it is teeming with thousands of galaxies, including the faintest objects ever observed in the infrared. As a result, galaxy cluster SMACS 0723 appears here as it would have existed 4.6 billion years ago. Image: NASA

The most powerful space telescope ever built is now performing beyond the expectations of its American, Canadian and European creators. It can see deep into space and time, but one thing it does not see, at least not yet, is the eclipse of Western scientific and technological expertise.

NASA released fantastic images in July of distant galaxies taken by the near-infrared camera on the James Webb Space Telescope, which orbits the sun 1.5 million kilometers from earth. Converted from infrared electromagnetic radiation that we can’t see into color photographs in visible light, they are works of science and art.

The photographs were created from digital data beamed back from the telescope. Image processing software and filters were used to turn the colorless data into red, green and blue images, which were then combined to create full-color photos. The red corresponds to the longest wavelength infrared data, the blue to the shortest.

On July 11, the first color photo from the Webb was released by President Joe Biden at the White House. Called “Webb’s First Deep Field,” it is an image of galaxy cluster SMACS 0723. As explained by NASA administrator Bill Nelson: “Webb’s First Deep Field is not only the first full-color image from the James Webb Space Telescope.

...JWT Photos

It's the deepest and sharpest infrared image of the distant universe, so far. This image covers a patch of sky approximately the size of a grain of sand held at arm's length. It's just a tiny sliver of the vast universe."

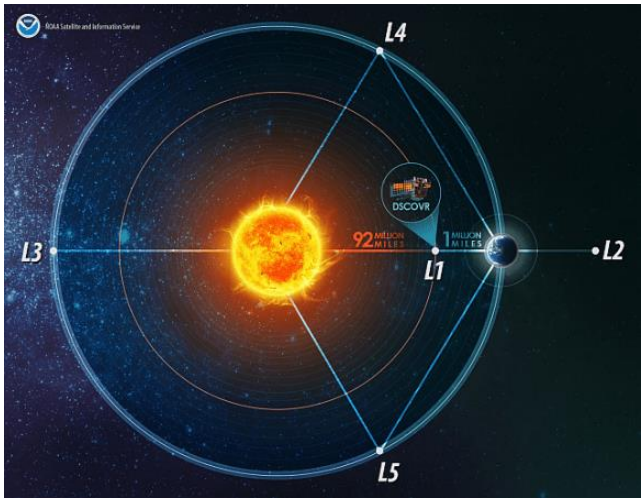
Yet, In the words of NASA, "it is teeming with thousands of galaxies – including the faintest objects ever observed in the infrared."

Thousands of galaxies behind a grain of sand. An ocean in a drop of water. Better focus on the practical implications and possibilities rather than succumb to vertigo.

In the calculations of NASA, the image of SMACS 0723 shows the galaxy cluster as it appeared 4.6 billion years ago. But Nelson told the press that the Webb can see much farther back in time than that:

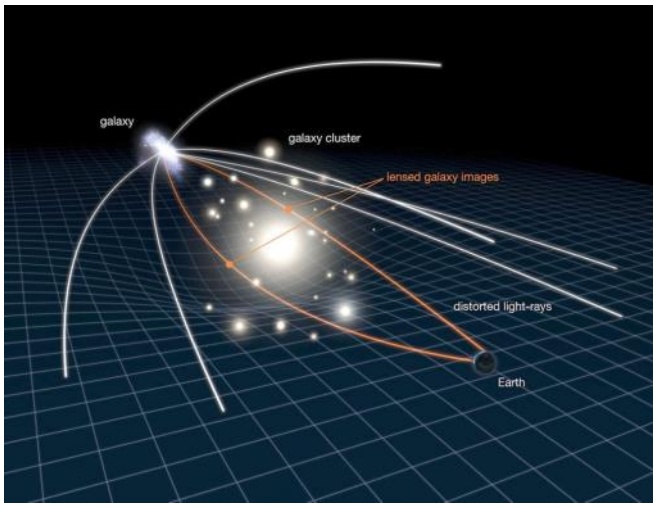
"Light travels at 186,000 miles per second. And that light that you are seeing on one of those little specks has been traveling for over 13 billion years. And by the way, we're going back further, because this is just the first image. They're going back about 13 and a half billion years. And since we know the Universe is 13.8 billion years old, you're going back almost to the beginning."

NASA said the Webb Space Telescope has "delivered the deepest infrared images of the universe yet. This deep field … is a composite made from images at different wavelengths, [over a period] totaling 12.5 hours – achieving depths at infrared wavelengths beyond the Hubble Space Telescope's deepest fields, which took weeks."



As explained by NASA, "There are five so-called "Lagrange Points" (shown right credit - NOAA) areas where gravity from the sun and Earth balance the orbital motion of a satellite. Putting a spacecraft at any of these points allows it to stay in a fixed position relative to the Earth and sun with a minimal amount of energy needed for course correction."

Webb's position at L2 permits it to stay in continuous communication with NASA's Deep Space Network of equidistant radio antennas situated in California, Australia and Spain. In routine operations, there is an uplink of command sequences and a downlink of data each day.



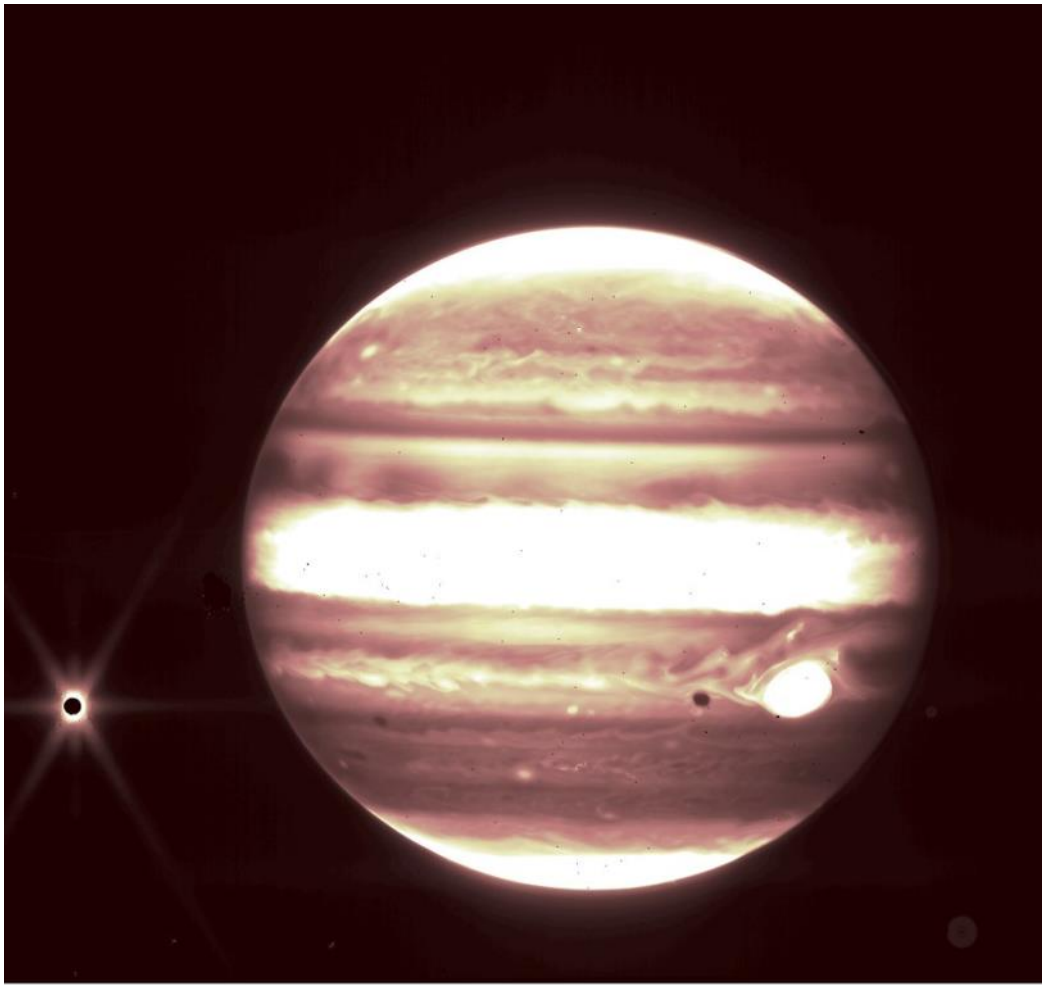
Another interesting aspect of the image is that it shows a phenomenon known as gravitational lensing in action. The combined mass of galaxy cluster SMAGS 0723 is warping and magnifying the light from more distant galaxies behind it. This presents astronomers with a sort of cosmic magnifying glass, enabling them to observe distant objects in greater detail. It's also why some of the light from those distant galaxies seems curved and warped. Now astronomers will begin to analyze and learn more about these distant galaxies and the tiny structures seen within.

...JWT Photos

The latest images from JWST show Jupiter and its moon Europa, captured by the telescope's NIRCam instrument.

Not long after the first JWST images were released on 12 July came these incredible images of the tempestuous gas giant planet and its intriguing moon.

NIRCam's short-wavelength filter reveals Jupiter's distinctive bands and famous Great Red Spot; a gigantic storm that's wider than planet Earth.



ABOVE: A view of Jupiter, its moon Europa and the Great Red Spot. To the left of the Great Red Spot is Europa's shadow. Credit: NASA, ESA, CSA, and B. Holler and J. Stansberry (STScI)

Yes, Jupiter has rings, and the Webb Telescope has managed to show these distinct features with remarkable clarity.

We can also see moons Thebe and Metis in the new Jupiter images.

"The Jupiter images in the narrow-band filters were designed to provide nice images of the entire disk of the planet," says John Stansberry, NIRCam commissioning lead at the Space Telescope Science Institute.

"But the wealth of additional information about very faint objects (Metis, Thebe, the main ring, hazes) in those images with approximately one-minute exposures was absolutely a very pleasant surprise."

...JWT Photos

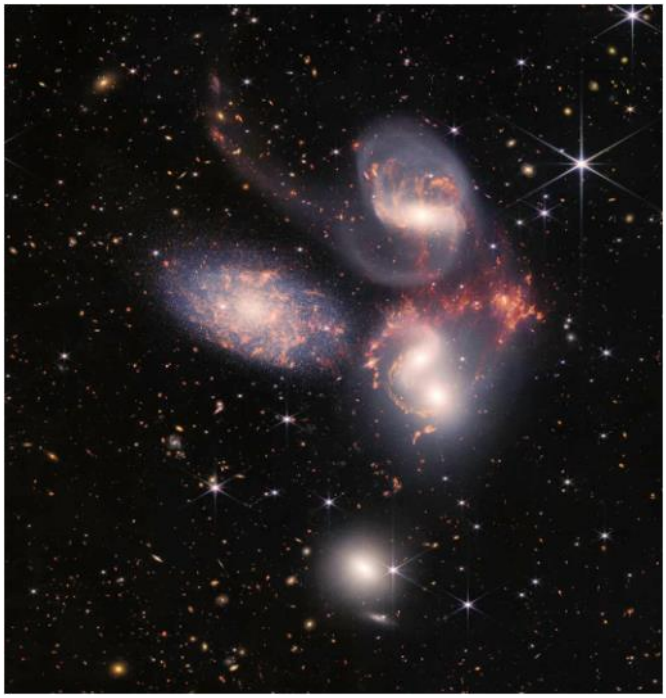
Southern Ring Nebula

ABOVE: The Southern Ring Nebula, NGC 3132, one of the first images released by the James Webb Space Telescope. Credits: NASA, ESA, CSA, and STScI

The Southern Ring Nebula is an object known as a planetary nebula, which is an expanding cloud of gas around a dying star. Their puffed-out, spherical appearance is what has given them the name 'planetary nebulae'.

Astronomers say that the dimmer star at the centre of the image has been emitting loops of cosmic gas and dust into space in all directions.

Two JWST cameras were used to capture this image of the planetary nebula, which is located about 2,500 lightyears away. The Southern Ring Nebula is visible to observers living in the southern hemisphere, as it can be found within the southern constellation of Vela.



Stephan’s Quintet

This is a group of galaxies known as Stephan's Quintet, a compact galaxy group located 290 million lightyears away in the constellation Pegasus, in the same patch of sky as the famous asterism known as the Great Square of Pegasus.

This brand new image of Stephan's Quintet contains over 150 million pixels and was produced using nearly 1,000 separate image files captured by the James Webb Space Telescope.

Webb's incredible image shows clusters of young stars and bursts of star birth across the galaxy group.

...JWT Photos

Stephan’s Quintet...

While it may seem like the 5 separate galaxies in the group are gravitationally bound, actually only 4 of them are. The 5th and leftmost galaxy is NGC 7320, and it's actually much closer to Earth than the other 4 galaxies.

NGC 7320 is 40 million light-years from Earth while the others are about 290 million lightyears away.

One of the major takeaways from this image is that Webb can provide an incredible view of galaxies gravitationally interacting and merging: a key aspect of understanding how galaxies evolve and change over time.

The Carina Nebula

ABOVE: Carina Nebulae - Credit: NASA, ESA, CSA, and STScI

The Carina Nebula is a glowing cosmic cloud found about 7,600 lightyears away in the southern hemisphere constellation Carina.

It's a common and well-known target for astronomers and astrophotographers, but none of them will ever have seen it like this!

This image of the Carina Nebula, NGC 3324, was captured in infrared light by the JWST and shows 'peaks' of glowing cosmic gas and dust about 7 lightyears high.

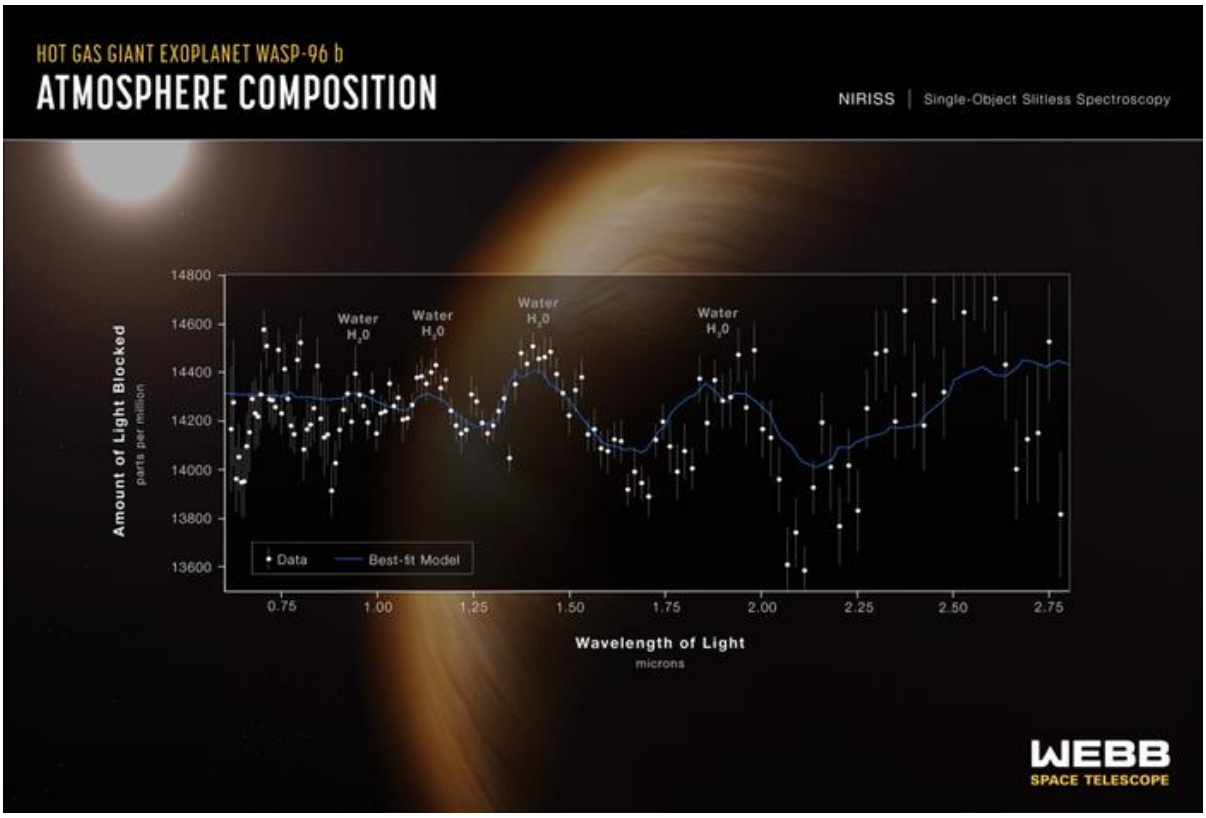
Ultraviolet radiation and streams of charged particles known as stellar winds are emanating from hot young stars within the nebula, sculpting and shaping the cavernous formations seen in this image.

JWST's infrared vision is able to peer through the cosmic dust to see stellar nurseries and individual newborn stars that would normally be obscured in optical light.

...JWT Photos

Images like these show just how much astronomers can learn from the Webb Telescope about how stars are born, how they affect and influence their own cosmic neighbourhood.

Exoplanet WASP-96 b (spectrum)



ABOVE: Transmission spectrum of exoplanet WASP-96 b, captured by the James Webb Space Telescope. Credits: NASA, ESA, CSA, STScI

WASP-96 b is a giant planet outside our Solar System, known as an exoplanet. The planet is composed mainly of gas and is located just 1,150 lightyears away. It's about half the mass of Jupiter and it orbits its star every 3.4 Earth days.

This is a transmission spectrum made by observing exoplanet WASP-96b. The spectrum was created by analysing light that passed through the exoplanet's atmosphere as it orbited in front of its host star.

Each of the 141 points on the graph shows the amount of a specific wavelength of light that's blocked by the exoplanet and absorbed by its atmosphere.

Note the labelled peaks in the graph, indicating the presence of water vapour in WASP-96b's atmosphere.

The heights of the peaks - along with other aspects of the spectrum - enabled astronomers to infer the temperature of the exoplanet to be about 1350°C.

This is the most detailed infrared exoplanet transmission spectrum ever produced, and an indication of just how much the Webb Telescope could revolutionise the field of exoplanet study.

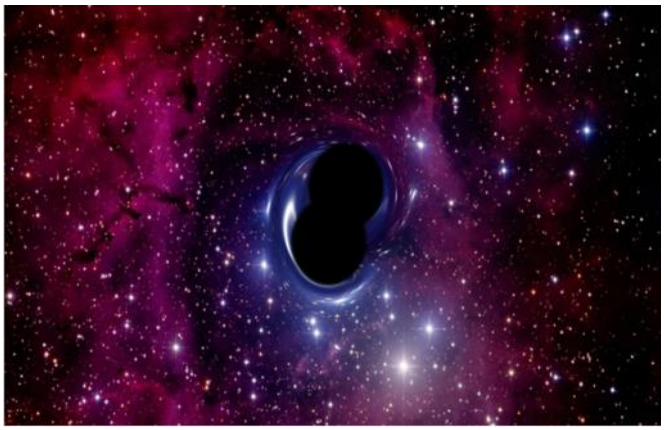
Sources:
https://www.skyatnightmagazine.com/space-missions/james-webb-space-telescope-images/ ; https://webb.nasa.gov/content/multimedia/images.html; https://www.nasa.gov/webbfirstimages; https://www.cfhtlens.org/public/what-gravitational-lensing

A Large Black Hole Collision Actually Shook Space-Time

The thing about interesting and good science is that it always leads to more questions than actual answers – and when it comes to black holes, our knowledge and our desire for more of it is always expanding.

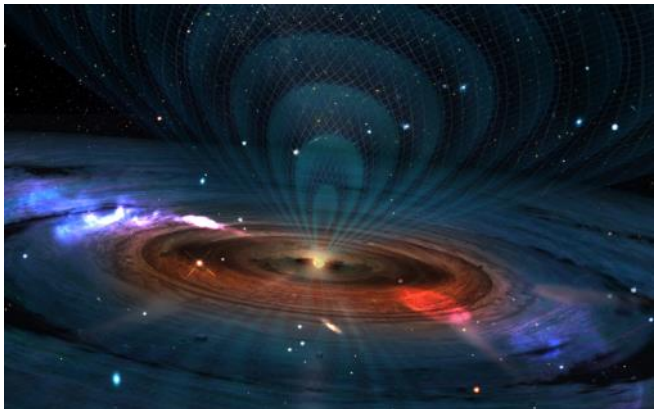
Back on May 21st of 2019, two giant black holes banged into each other, 7 billion light-years away from Earth.

Spacetime reacted by stretching, collapsing, jiggling, and producing gravitational waves that rippled across the cosmos.



Scientists here detected the disturbance using LIGO, (Laser Interferometer Gravitational-Wave Observatory) a pair of identical, two-and-a-half-mile-long interferometers in Italy, and they're calling it the biggest farthest, and "most energetic" black hole merger ever.

The resulting black hole is about 142 times more massive than the sun. They published their findings in Physical Review Journals and Astrophysical Journal Letters. The signal only lasted a tenth of a second, but scientists were excited nonetheless.



"It's the biggest bang since the Big Bang that humanity has ever observed. It could offer clues as to why the Universe looks the way it does."

This massive black hole is the first of "intermediate mass" ever confirmed.

Astrophysicists like K.E. Saavik Ford of the Graduate Center at City University New York thinks there is definitely more than one reason to be excited.

"It's a bridge between the black holes that are formed directly when stars collapse and supermassive black holes that we find in the centers of galaxies . That takes many, many, many lifetimes of the universe under anything like normal circumstances, so it had to have happened in a very dense stellar environment."

LIGO is currently offline, but the facilities will be back online soon and astronomers like Weinstein hope they'll be able to look further into space – and farther back in time, too. "We need to look for more exotic events like this one – and for more exotic events like nothing we have ever seen before. Wouldn't that be great?"

I think that every science enthusiast out there – even the ones who are much more casual – can agree that it definitely would be.

ASSA Durban Minutes of General Meeting

1?? JULY - 19:30 via Jitsi (JHB) and Zoom (DBN)

Attendees:

Present and Apologies:	As per attendance sheet		

1. **Welcome (Annual General Meeting)**

x Amith welcomed the members into the Durban meeting, also hosted by Gerald on Zoom.

x Richard Rowland acknowledged notice of the meeting

x Amith noted that after the meeting there would be an opportunity to watch the full-moon through some telescopes.

2. **Previous meeting minutes**

x Acceptance of minutes proposed by Mike Hadlow and seconded by Gerald de Beer

x There were no matters arising from previous minutes

3. **Chairman Report**

x There have been several recent successful outings

x Sutherland trip is still suspended and awaiting further information. Airline has ceased operation and it is difficult extracting information from them.

x Amith thanked the committee members for their support throughout the past year.

Some committee members are planning to step down: John Gill, Corinne Gill, Mike Hadlow

New committee members nominated and accepted: Fiona Khan, Yesen Govender, Rowena Baldew

x Gerald de Beer has faithfully hosted the Zoom meetings and received special thanks.

x Guest speakers through the year have been captivating and Piet Strauss received special thanks.

x Amith thanked everyone present and watching for being part of the family.

4. **Finance:**

x Corinne Gill prepared and presented finance report.

5. **Library**

x Amith presented library report on behalf of Claire Odhav.

6. **Observatory**

x Mike Hadlow presented the Observatory report. Alan Marnitz will be taking over from Mike, and more people are needed for hosting viewing evenings.

7. **Instruments and assets**

x Amith presented instrument and asset reports.

...Minutes of the Meeting

8. **Media**
   - x Amith presented media and publication report on behalf of Claire Odhav.
9. **Events**
   - x The Sheryl Venter presented a report on past and planned events
10. **Astronomer of the Year**
   - x The award was handed to Ray Field, for his continuous contribution of ‘At the Eyepiece’ in the monthly nDaba.
11. **Outgoing awards**
   - x Amith presented awards to outgoing committee members, for their service: John Gill, Corinne Gill, Mike Hadlow
12. **General**
   - x No further matters to discuss
   - x The next General Meeting will be held on **10th August 2022**
   - x Venue: School
13. **Meeting closed**
   - x Amith closed the meeting at 21:10 and invited everyone for tea.

DURBAN ZOOM MEETING

Durban members meeting.

Meeting ID: 88037701479

Passcode: 297674

Public Viewing Roster
ASSA Durban

Dome Master	Email	Assistant	Telescope Volunteer	Public Viewing
John Gill	John@astronomydurban.co.za	Sheryl Venter	Sheryl@astronomydurban.co.za	26 August 2022

PUBLIC VIEWING:

Public viewing is on site at the Marist Brothers St Henry's School in the dome and around the pool area; usually the first Friday evening closest to the New Moon.

Please note there is a roster with a booking system. Once the number of telescopes are confirmed, Individuals will be contacted to confirm dates and times. Please book your place!!!

NOTIFY OBSERVATORY MANAGER:

Members interested in attending the above viewing evenings and/or becoming involved in assisting with the viewing evenings, please send your names to Alan Marnitz on cell number 082 305 9600, or via email: alan@astronomydurban.co.za

VOLUNTEERS REQUIRED:

Volunteers to please identify which role you are willing to assist with, Dome Master, Viewing Assistant or a Telescope Volunteer. After which, attendance will be confirmed and viewing dates will be announced.

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 Volunteers - Members willing to bring their telescopes to the viewing evenings to set up around the pool for public viewing.

VOLUNTEERS TUTORIAL:

Mike Hadlow to organise an afternoon / evening to train volunteers as Dome Masters and the use of the large telescope. Date to be confirmed and viewing dates will be announced ASAP.

Viewing Contacts:	Phone	Email
Alan Marnitz	082 305 9600	alan@astronomydurban.co.za

Notice Board

MEETINGS:

- GENERAL MEETING to be held on **10th August 2022** at the school @ 7:30pm.
- PUBLIC VIEWING MEETINGS - please refer to website under the tab "Viewing and Events" for any updates with regards dates & public viewing under the current Covid restrictions; or click here: https://astronomydurban.co.za/events-viewing/

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. Check it out.
- Available from the ASSA website assa.saao.ac.za/about/publications/nightfall/

MEMBERSHIP FEES & BANKING:

- **Membership fees are now due for the 2022-07-01 to 2023-06-30 financial year.**
- **Please pay your subscription fees via EFT.**

Pay Fees Online

Membership fees indicated below:

- Single Members: **R 190:00**
- Family Membership: **R 230:00** for family membership.
- Under 18 members: Free
- Cash/Cheques: **Please note: NO cheques or cash will be accepted - Cash deposits incur bank charges**
- Account Name: **ASSA Natal Centre**
- Bank: **Nedbank**
- Account No. **1352 027 674**
- Branch: **Nedbank Durban North**
- Code: **135 226**
- Reference: **SUBS 22-23 SURNAME and FIRST NAME**
- Proof of Payment: treasurer@astronomydurban.co.za

SKY GUIDE 2022 and ASSA MASKS - Limited number available !!!

- SKY GUIDES **SOLD OUT**
- MASKS: R **50:00** each with payment reference: **MK - SURNAME and FIRST NAME**

Please ensure proof of payment is sent to the Treasurer at treasurer@astronomydurban.co.za

RESIGNATIONS from ASSA:

Please send an email immediately notifying the Secretary at secretary@astronomydurban.co.za stating your wish to resign from the society.

COMMITTEE POSITIONS & CONTACTS:

Chairman	Amith Rajpal	Amith@astronomydurban.co.za
Vice Chair	Debbie Abel	Debbie@astronomydurban.co.za
Secretary	Francois Zinserling	Secretary@astronomydurban.co.za
Treasurer	Francois Zinserling	Treasurer@astronomydurban.co.za
Guest Speaker Liaison	Piet Strauss	Piet@astronomydurban.co.za
Observatory & Equipment	Alan Marnitz	Alan@astronomydurban.co.za
Observatory Assistant	TBC	
Publicity & Librarian	Claire Odhav	Claire@astronomydurban.co.za
Out-Reach - Public	Rowena Baldew	Rowena@astronomydurban.co.za
Out-Reach - Schools	Sihle Kunene	Sihle@astronomydurban.co.za
St. Henry's Marist College Liaison	Moya O`Donoghue	Moya@astronomydurban.co.za
'nDaba Editor	Fiona Khan	Fiona@astonomyduran.co.za
Website & Facebook	Yesen Givender	Yesen@astronomydurban.co.za

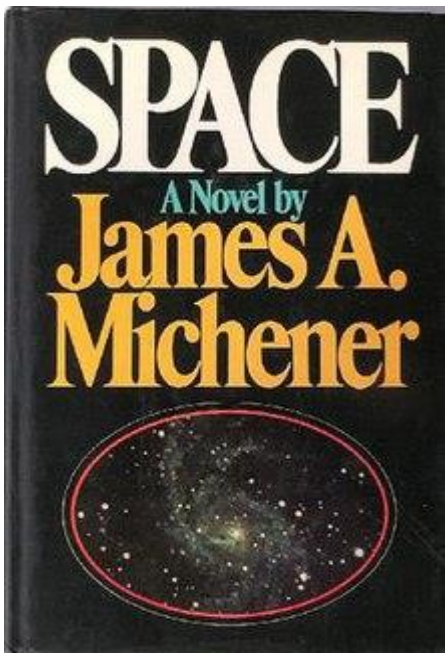
ELECTRONIC DETAILS:

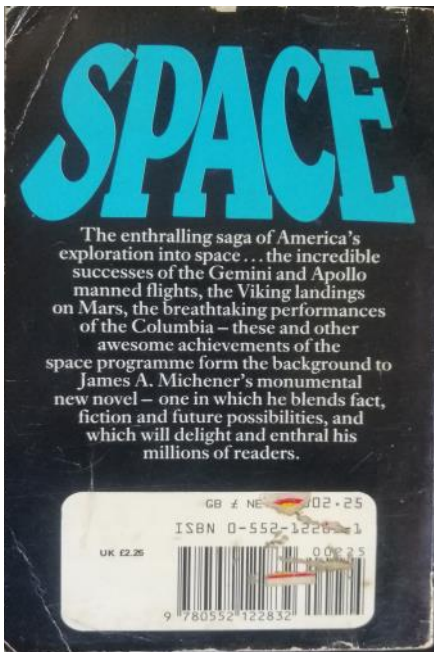
- Website: www.astronomydurban.co.za
- Emails : AstronomyDurban@gmail.com
- Instagram: https://www.instagram.com/astronomydurban/
- Facebook: https://www.facebook.com/groups/376497599210326

Library Books For Loan to Read:

SPACE by James Michener

Reviewed by Claire Odhav





This book has landed in my lap numerous times over the Last few years. My dad, (Who usually reads a book a week, though not much fiction these days) repeatedly explains how James Michener is a master story teller! So I looked it up... I've not found a single unhappy review. While I understand that it is fiction, (a treat usually reserved for holidays) a large amount of history and facts have been woven into the story. I have excitedly added it to my ever growing pile of books to read and savour.

Here are some reviews and a bit about the book, which may entice you to grab a copy yourself:

This book is an incredible journey into the history and science which has created the space tech we have today.

As we follow the American story to land on the moon we learn about aviation and test pilots, the Gemini and Apollo projects, Voyager 1&2 and the dream to travel to Mars and Jupiter and Saturn and beyond. In the process we see the human struggle to overcome scientific and political barriers.

"Michener may be too detailed for some, but I loved the way he built this story bit by bit. There's a passage in the book where a reporter describes how Korean pottery is painted, and it could summarize his method of writing - layer upon layer, detail upon detail. The book gave me such a depth of appreciation of the race to put a man on the moon. It's one thing to read the facts of if, but to have it told through multiple perspectives of characters you become connected to, to learn just how much went into it through symbolic individuals - it's kind of breathtaking. There was so much sacrifice amidst the success.

The book also gave me a deeper appreciation of how old some of the back-and-forth arguments about NASA are - almost all of the stuff we hear about now in terms of politics was going on back then. Even the science arguments of sending men vs. machines was debated early in the story.

I recommend this book to anyone who loves learning about the history of our space program and what went into it. It's a beautiful story, so well told, that it will resonate with me for a long time."

" I have to say that the Apollo 18 mission was so stressful that I sat in my car during my lunch breaks to see what would happen."

" Having both a great deal of science and politics, Kyle and I found it easy to like this book. I enjoyed the problems and discussions that went into launching our first rockets. Even the political side of this book flowed smoothly and brought the story together for the reader. 'Space' tries to get all of the viewpoints of the space race while maintaining Michener's ideas and thoughts on what should have happened. It is always nice to be able to look on the past to see where we went wrong. This books tries to do that along the way of telling somewhat accurately what really took place. Looking back on the book, I wouldn't be able to pinpoint a slow part or a chapter that I could have done without."

For a full list of books, posters and puzzles on space, contact Claire, on 083 395 5160