



ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

Durban 'nDaba



Monthly Newsletter of the Durban Centre - October 2022

© Gerald de Beer

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Chairman's Chatter

October 2022

Dear ASSA members

We have had the opportunity to see images further back in time than we thought possible all thanks to the James Webb Space telescope. These stunning images have us all in awe and scientists enjoying the data.

On 26 September 2022, we witnessed our first real attempt at an asteroid planetary defence system with the DART mission. This was launched nearly 10 months prior on 24 November 2021. The asteroid poses no threat to Earth but was merely a test to see if we could divert any asteroid directed toward our planet safely away. See page 22 for update thereof.

There are very few clear nights available around this period for viewing and imaging, so please make the most of them when you can. The night of the Jupiter opposition was sadly overcast and not possible to experience from my location.

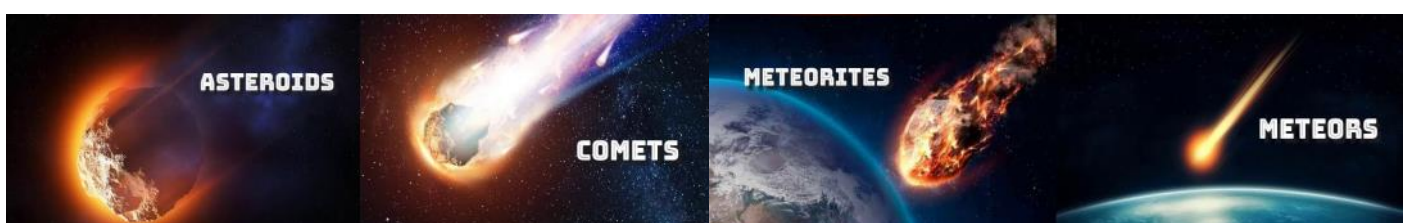
I've not been able to setup a telescope on 08 October 2022 but I did managed to snap a quick handheld photo of the Moon and Jupiter using my Canon 600D and 500mm Lens.



Our year end function is fast approaching and we will be setting up a sub committee to arrange this event. Should any of our members wish to join the sub committee, please contact Claire Odhav.

I look forward to seeing you all at our next virtual meeting on 12 October 2022.

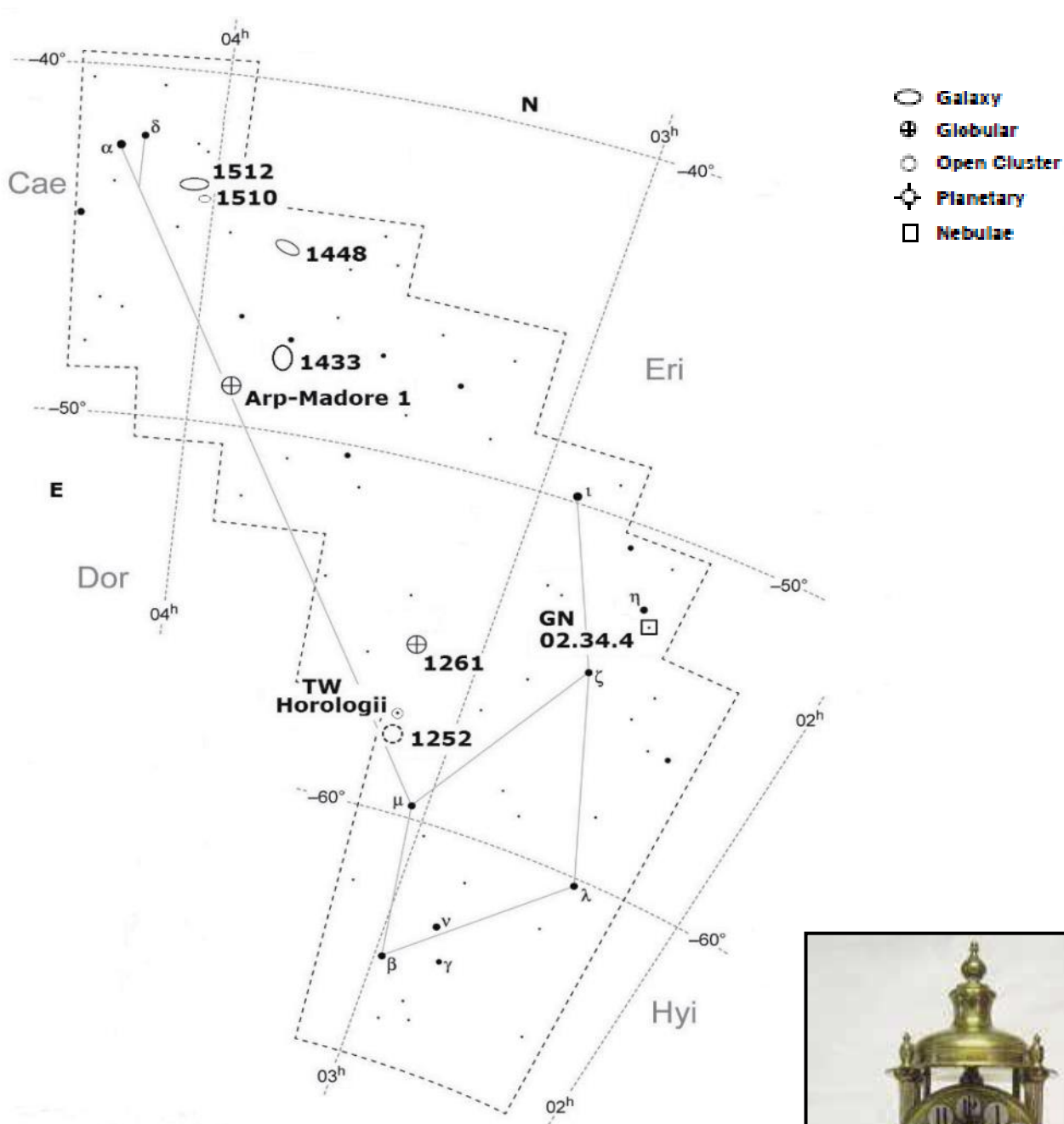
As always, stay safe and wishing you all many clear skies for the New Year. Amith Rajpal.



Astronomy Delights: Horologium

The Pendulum Clock

By Magda Streicher



The constellation of Horologium

RIGHT: This old family clock is close to 100 years old



...Horologium

“Time and tide wait for no man” – a proverb of which the truth is in no doubt. Everything revolves around time, which is why it isn’t at all strange to find a starry clock in the sky! Horologium is such a constellation.

Going back somewhat in time, Frikkie de Bruyn has drawn our attention to the following: By the end of the 19th century scientists believed in a universal quantity called time which all clocks would measure. However, Einstein’s theory of relativity has overthrown two pillars of the 19th century science: absolute rest, as represented by the idea of an all-pervading ether and absolute or universal time. Every person has his or her own personal time. If two people were at rest with respect to each other their times would be the same, but not if they were moving. This has been proved in a number of experiments, including one involving two atomic clocks which were flown in opposite directions around the world and showed slightly different times on their return.

Let us spend some time in the constellation Horologium which lies between Eridanus to the north, Dorado, diagonally eastward, and Hydrus to the south. The constellation was originally named Horologium Oscillatorium to honour Christiaan Huygens, the famous Dutch scientist, inventor of the pendulum clock in 1657, and the discoverer of Saturn’s rings.

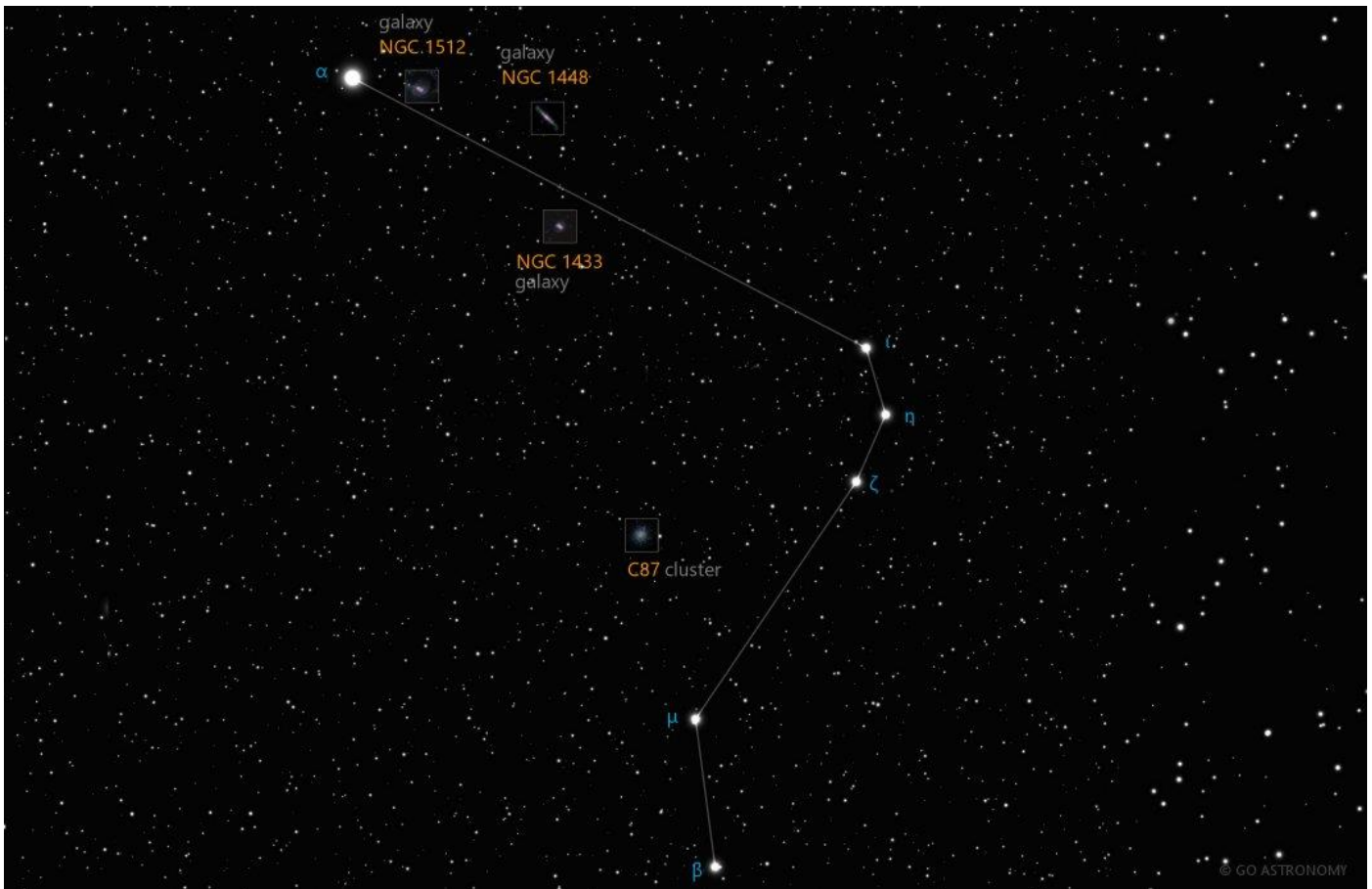
RIGHT: Christiaan Huygens, the famous Dutch inventor, scientist, engineer, physicist, mathematician, and astronomer.

Horologium is one of Nicolas Louis de Lacaille’s fourteen constellations which he named during his stay at the Cape of Good Hope. It was with this visit that he established the framework for astronomy in South Africa. In my mind’s eye I clearly see the gentleman de Lacaille also carrying his pocket watch with some pride, elegantly attached to his jacket by means of a gold chain. Time possibly stood still for him too, so that he was able to explore the beautiful southern night sky in sheer amazement. Tom Polakis captures the truth by commenting: “Within the Clock constellation you’ll go back in time to find some of the southern hemisphere’s most distant galactic gems.”

RIGHT: Nicolas Louis de Lacaille, a French astronomer and geodesist who named 14 out of the 88 constellations



...Horologium



The constellation stretches from alpha Horologii in the north-east to beta Horologii in the south, a distance of more than 20 degrees. The bend in the pendulum clock section, turns about iota, eta and zeta Horologii. One could say the pendulum is hanging elegantly along a line from mu to alpha Horologii, housing a wealth of deep sky objects to be studied on its arc. The first “i” in Horologium comes from the constellation name itself. In Latin in most cases, the genitive form of nouns whose nominative form ends with –um or –us is made simply by replacing the um or us to i. If the last letter preceding the -us or -um happens to be another i the then resulting genitive form ends up ending in double ii.



ABOVE: beta Horologii Cedit: I n-the-sky.org

Our starting point in time is the super-white magnitude 4.9 beta Horologii which is situated only 25 degrees north of the southern celestial pole. The star mu Horologii, points the way another 2 degrees north-east to the open cluster **NGC 1252**. This grouping is arranged in a V-formation, pointing north. The area in between is filled with fainter members. A lovely, yellowish magnitude 6.2 star, HD 20037, dominates this grouping and is situated towards the middle area of the western leg of the cluster, so to speak. It is

not certain if this group is a true open cluster, although spectroscopy has suggested that around a dozen of the members are at the same distance, about 2000 light-years away, but they are not related.

...Horologium

Don't miss the beautiful red carbon star TW Horologii, normally magnitude 5.7, which displays slight variations of magnitude 0.6. It is one of the sky's brightest carbon stars. This Type-N semi regular variable star, located a few arc-minutes north-east of NGC 1252, is most probably a member of the cluster.



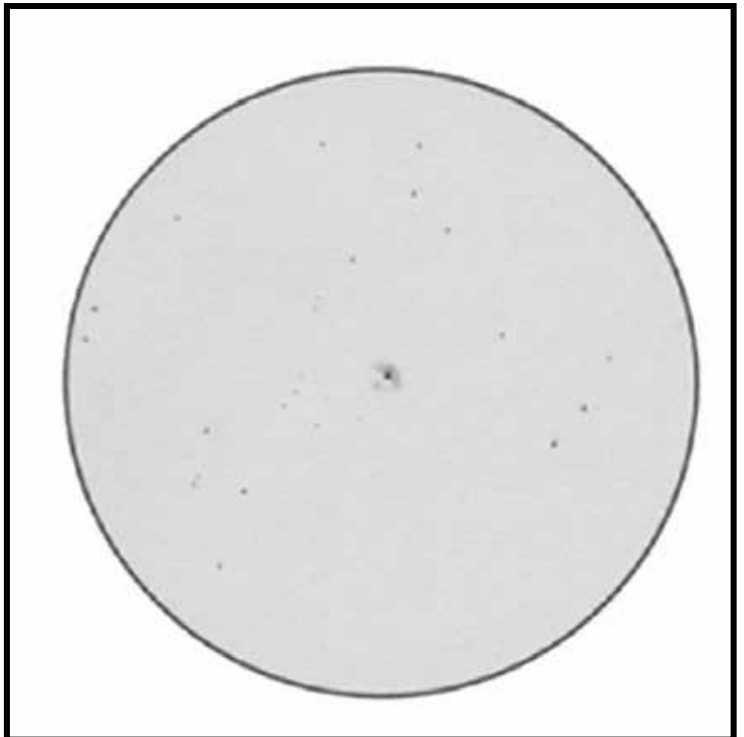
ABOVE: NGC 1261 – Photograph: NRGBhi

Still on the move, like the typical hand of a clock, and yet another 2.3 degrees to the north, we encounter the globular cluster **NGC 1261** also known as Bennett 11. One's first impression is that of a very nice, bright object, well condensed, quite round in shape with no sharp edges. With higher magnification, the frosted glow becomes granular in texture, with a random sprinkle of faint stars. The core appears slightly elongated in a north-south direction with a knot of stars on the cluster's northern edge. A prominent magnitude 9 yellow star is situated about 4' to the north-east. Jenni Kay described it as "a stunning peppery

glow with a brief flickering of countless stars". The galaxy pair ESO 155-10 is situated 4.5' to the south-west, but is far too faint to even glimpse through ordinary telescopes.

The magnitude 5.2 eta Horologii marks the bend of the indicated time zone, which is 33' north of the small emission nebula **GN 02.34.4**. This nebula is about 250" in diameter, and surrounds the magnitude 8.3-star HD 16405, which illuminates it.

One of the most distant globular clusters, **ARP -MADORE 1**, is situated in the eastern part of the constellation, half a degree east of the galaxy IC 2004. Astronomers discovered this object on plates taken with the Cerro Tololo 4-metre telescope in 1979, confirming the nature of this object as a globular cluster. It is a truly distant object associated with our Milky Way, with speculation that it could be as much as 400 000 light-years away. It is believed to display only a small circular haze, less than 1' across, understandably with no stars resolved.



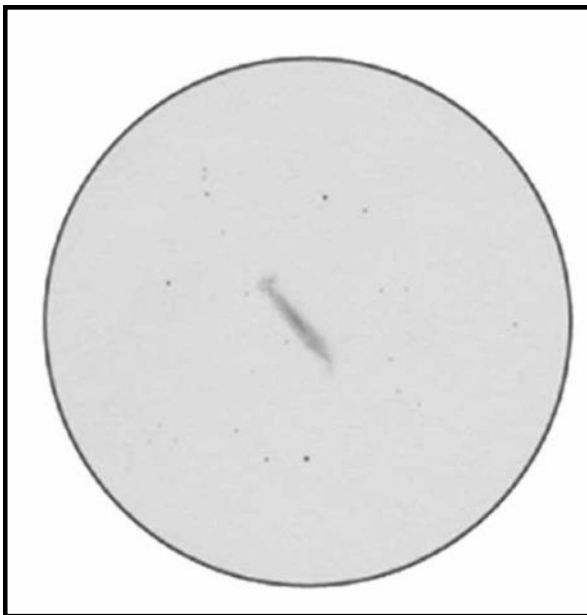
ABOVE: GN 02.34.4 – Nebula

...Horologium

NGC 1433 rides the centre of the pendulum between alpha and iota Horologii, a distance of nearly 17 degrees. The galaxy appears as a fairly large, circular to oval smear of light. From a relatively bright bar-like nucleus it shades out to form a woolly outer edge. Careful observation reveals detail around the core and outer halo. Known as a barred spiral or prototype ring galaxy, it has faint arms connected to the east and west ends, understandably visible only with much larger telescopes. The small oval galaxy IC 1984 is positioned 24' west of NGC 1433.

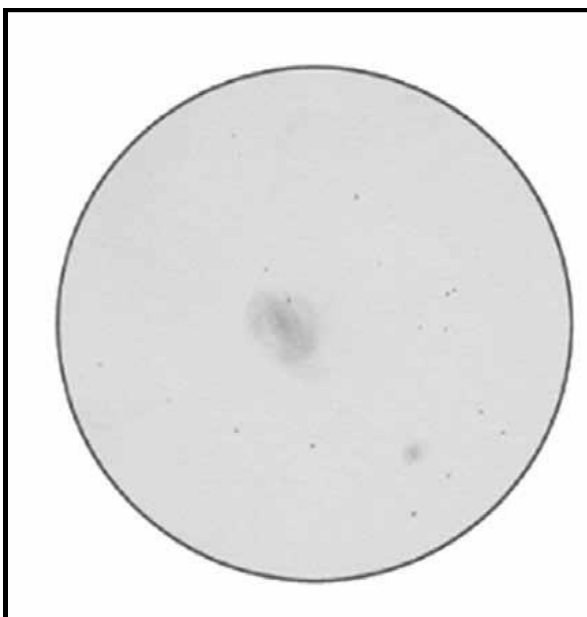


ABOVE: NGC 1433 – Photograph: Flickr



Tick-tuck another 2.5 degrees further north to a fine example of an edge-on galaxy. **NGC 1448**, also listed as NGC 1457, displays a beautiful thin ray of light in a north-eastern to south-western direction. The north-eastern tip of the light-ray is slightly hazier and curving towards the north. Although the core is extended it does not sport a prominent nucleus.

LEFT: NGC 1448 Galaxy



The elegant pendulum bob is represented by the magnitude 3.8 alpha Horologii in the far north-east of the constellation, with magnitude 4.9 delta Horologii its close neighbour. These two stars are only 40' apart, and beautifully convey the impression of a little bob. The galaxy **NGC 1512** forms a long triangle of 2 degrees south-west of the two abovementioned stars. The galaxy has a soft circular glow, revealing a fractionally distinct bar across the middle. The inner nucleus brightens up to a stellar appearance. James Dunlop described it as a small faint round nebula, a little brighter in the center. John Herschel also noted that it is slightly elongated but curiously, in a second observation he called the object a “globular cluster resolved into stars barely perceptible”. Recent Hubble photographs show a wide circumnuclear starburst ring of infant star clusters. The very faint companion galaxy **NGC 1510** is situated on the south-western edge and is just a glimmer of light, barely visible.



ABOVE & RIGHT: NGC 1512 and NGC 1510 – Galaxies. CREDIT: ESA/Hubble esahubble.org

...Horologium

If we think of well-known clocks around the world, the first one that comes to mind is of course London's Big Ben. Located at the Houses of Parliament, Big Ben features in songs, movies and many photographs. Times Square's Clock needs no introduction, but the fairly ordinary Cuckoo Clock is one I remember from my childhood days.

The world's largest clock is the Pyramid Clock in the temple City of Chechen Itza, Mexico. However, a clock which has an incredible record for accuracy is Rome's Tower Clock, also on the World's National Register of Historic Places. More than 946 000 hours of history have been marked by the sound of this clock. Shown Right.



The historical Strasbourg Cathedral Clock, which dates back to 1843, stands an incredible 18 metres tall. For our star-lovers the Orloj Astronomical Clock in Prague is worth remembering – it is a mechanical clock and astronomical dial, dating back to 1410. Shown on Left.

Then there is the Jens Olsen's World Clock in Copenhagen – it tells the time, shows the night sky, Moon phases and Solar eclipses, and consists of 12 movements, which together have over 14 000 parts. Shown Right.



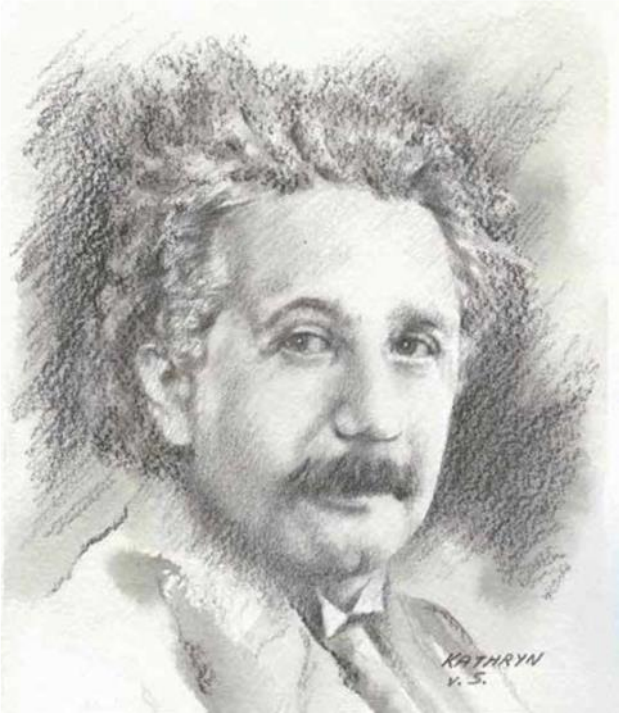
One of the most intriguing clocks was built by George Jessop near Ely, Nevada, and is now in the Horton Mall in downtown San Diego. On the day its creator died, the clock stopped and no-one was able to get it going again, or so they say. Shown Left.

BELOW: Bath Abbey with its prominent clock dates from 1499. According to Andrew White, after it was built it housed a community of Benedictine monks, this is why it is referred to as an abbey and not a cathedral.



*Time waits for no-one,
so please create some
time to watch the
starry skies
above you at night.*

...Horologium



ABOVE: Albert Einstein – Pencil Sketch:
Kathryn van Schalkwyk



ABOVE: Myself with Albert Einstein in
the Madame Tussauds

Albert Einstein was born on Friday 14 March 1879 in Ulm, Southern Germany. He was the only son; a quiet and rather solitary child referring to read and listen to music. Einstein's Special Relativity Theory include his famous equation $E = mc^2$ (E = energy, m = mass and c = the speed of light), which goes on to predict that nothing real can travel faster than the speed of light and the faster anything travels the slower time will seem to pass. Einstein received the Nobel Prize for Physics in 1921. He was also awarded the second Planck medal to be issued by the Royal Prussian Academy in 1929. Even when he was lying gravely ill, he asked for the latest pages of his mathematical calculations. Einstein died on 18 April 1955

OBJECT	TYPE	RA	DEC	MAG	SIZE
GN 02.34.4	Emission Nebula	02h36m.1	-53°02'.8	8.3	250"
NGC 1252	Open Cluster	03h11m.4	-57°38'.5	8.4	20'
NGC 1261	Globular Cluster	03h12m.3	-55°13'.1	8.3	6.8'
TW Horologii	Carbon Star	03h12m.6	-57°19'.0	5.7	*
NGC 1433	Galaxy	03h42m.0	-47°13'.0	9.9	6.5'×5.9'
NGC 1448 NGC 1457	Galaxy	03h44m.5	-44°39'.2	10.7	7.6'×1.7'
ARP-MADORE 1	Globular Cluster	03h55m.0	-49°36'.0	15	1'
NGC 1510	Galaxy	04h03m.5	-43°24'.1	12.7	0.9'×0.9'
NGC 1512	Galaxy	04h03m.9	-43°21'.0	10.3	8.9'×5.6'



At the Eyepiece

October 2022 by Ray Field

The Moon is First quarter on the 3rd, Full on the 9th, Last quarter on the 17th and New Moon on the 25th. The Moon is near Saturn on the 5th, Jupiter and Neptune on the 8th, Uranus on the 12th, Pleiades on the 13th, Mars on the 15th and Antares on the 28th. The Moon occults the star delta Scorpii on the 27th.

Mercury is visible briefly in the morning twilight this month. It rises about 05:00 over the East. To the naked eye, Mercury looks like a bright orange-red “star”. The Moon is near Mercury and Spica on the 24th. Mercury on the 8th, will be at its highest above the eastern horizon.

Venus, the brightest planet, is difficult to see because of its closeness to the Sun. On 22nd of this month it will in fact be at superior conjunction, on the far side of the Sun as seen from Earth and will not be visible. It will reappear as the “Evening Star” early in December.

Mars, the “Red Planet” is a very bright planet in the sky this month. Its orange-red colour is noticeable. It rises about 23:30 at the start of October, and by 22:00 at the month’s end. Mars spends the month in Taurus and the Moon is near Mars on the 10th.

Jupiter is a very bright object in Pisces this month. The Moon is near Jupiter on the 8th. Jupiter is visible most of the night, setting at about 05:00 on the 1st and by 04:00 on the 31st.

Saturn, in Capricornus, appears as a brightish “star” to the naked eye. In a telescope, its ring system can be seen. Visible most of the night, Saturn set at 03:30 on the 1st and by 01:30 on the 31st, making it an evening object all month.

Uranus, barely visible to the naked eye, but easy in binoculars, is in Aries all month. It is visible nearly all night, but needs special charts to find it amongst the stars of the sky.

Neptune, needing binoculars or a telescope to be seen is even fainter than Uranus and is harder to find. It is in Aquarius all year.

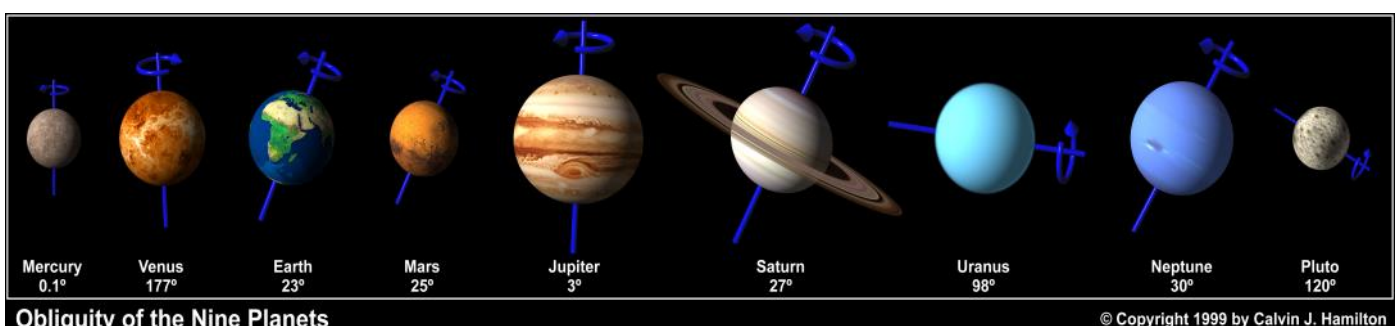
Meteor Showers (page 86 Sky Guide 2022)

Orionids - Max 21 Oct, Visibility 2 Oct to 7 Nov, Radiant 16°N, ZHR 20, watch 00:00 to 04:00

The Starry Sky from Durban.

The Great Square of Pegasus is over the N.E., low down. The bright star Achernar is rising over the S.E. and the “Southern Birds” including Grus, the Crane and Pavo, the Peacock, are high over the South. Scorpius is about to set over the West, followed by Sagittarius, which is still well up. The “Southern Milky Way” including the “3 crosses region”, is out of sight or very low above the Southern horizon.

References include:- ASSA Sky Guide Africa South 2022, Norton’s Star Atlas, Philips Planisphere for latitude 35°S and Stars of the Southern Skies by Sir Patrick Moore.



Obliquity of the Nine Planets

© Copyright 1999 by Calvin J. Hamilton

A Primer on Telescope Mounts

By Brian Ventrudo



ABOVE: A professional-grade German equatorial telescope mount . Image: Bisque.com

Even the most expensive and carefully crafted telescope isn't worth much if it's not on a solid and stable mount that lets you accurately point it anywhere in the sky. A good telescope mount is as important as the optics of a telescope, and it must be sufficiently solid and stable such that if you give the telescope tube a good tap on the side, the mount should damp down vibrations in less than 5 seconds (max), and faster if you're planning on astrophotography. Most telescopes, especially scopes aimed at beginners, include a mount when you buy them. Smaller telescopes, especially high-end refractors, may just have mounting rings or plates which allows them to be attached to a mount which you buy separately. And if you are contemplating astrophotography, a solid mount is a must-have

All telescope mounts can be classified as one of two types: alt-azimuth or equatorial. Let's have look at each.

Alt-Azimuth Mounts

Alt-az mounts are a good choice for observers who value simplicity, fast set-up, and who have no plans to do photography through the telescope. An *alt-azimuth mount* lets you move a telescope move up-down (altitude) and left-right (azimuth). With these two motions, you can point a telescope to any object in the sky. But an "alt-az", as they are called, does not follow the natural motion of the sky. Stars and planets appear to move around the sky in circles centered about an imaginary line through the north and south celestial poles. They follow a path in the sky that's a combination of altitude and azimuth. So to keep an alt-az-mounted scope centered on a celestial object, you'll have to move the scope in both axes, which can be bothersome for visual observing and completely unacceptable for photography through a telescope.



ABOVE: Dobsonian RiGHT: a Schmidt-Cassegrain on alt-az mounts



Dobsonian reflectors are usually mounted on a fork-type alt-az mount called a "rocker box". You give them a push in one or both axes to point the telescope. In many cases, the telescope is held in place by the mount's friction. Other types of alt-azimuth mounts are simply like a camera tripod, with bearings and joints that enable a simple and intuitive motion of the telescope. Still others are drive by motors and computers to track objects across the sky and help you point to any of thousands of objects in a database in a handheld computer. But even with

motorized tracking, alt-az mounts do not work for long-exposure astrophotography because the field of view in the eyepiece or camera appear to rotate over time, an effect known as 'field rotation'.

...Telescope Mounts

Equatorial Mounts

A more complex mount, one that's designed to track the motion of the stars by turning on a single axis, is called an *equatorial mount*. When the "polar axis" of an equatorial mount is aligned to the celestial pole, objects can be tracked with the movement of only the polar axis. Because only one axis needs to be moved, equatorial mounts can be more easily motorized to track celestial objects and keep them in the field of view. And when the object is tracked, the field of view stays in a fixed orientation, which is essential for astrophotography. Of course, to get an object in the field of view in the first place, the telescope must still be moved in both axes.



LEFT: A German equatorial mount

There are many variations of equatorial mounts; they all tend to be larger and heavier than alt-az designs. The most common is the German equatorial mount, pictured above. The "GEM" holds the telescope in a saddle and balances the weight of the telescope with a set of counterweights. A fork mount, with the tines of the fork aligned with the pole, is another common type of equatorial mount.

An equatorial mount takes a little getting used to, but it's a powerful tool for moving a telescope about the sky and it's indispensable for astrophotography.

Go-To and Push-To Mounts

Some telescopes come with motorized alt-azimuth or equatorial mounts with computerized databases, hand-held computers, and motion sensors on each axis to let you automatically point the scope around the sky at the push of a button. You must enter the current date, time, and location, and align the mount to two or three bright stars (which you need to know how to find yourself). Then the computer and mount can point and track thousands of celestial objects. Some "go to" mounts include a GPS module so you don't have to enter your time and location. A few even let you choose a guided tour of the best celestial sights, complete with a digital readout or audio track describing information about each celestial object. There is a learning curve with a go-to mount simply because you have to set it up and align it to the night sky. But it's not too hard.



LEFT: A Schmidt-Cassegrain telescope with an altazimuth mount, motors, and go-to computer

Go-to telescopes are a great convenience, and help you spend more time looking at objects and less time finding them. Go-to's are a great help for beginners who are often frustrated by finding faint celestial objects. And they are a wonderful tool for city-based astronomers, even experienced astronomers, who struggle to find faint stars to guide them from object to object in murky urban skies.

...Telescope Mounts

Most major telescope brands have their own version of go-to mounts and controller/computers. Well-tested and reliable incarnations of go-to controller systems include NexStar (Celestron), SynScan (Skywatcher), Autostar (Meade), and Orion's version which does not have a fancy name.

Some telescopes, especially Dobsonians, have altazimuth mounts equipped with sensors that detect the movement of each axis, and a computer to help make sense of the movement. But they do not have motors to move the telescope in either axis. The movement must be supplied by the observer, who merely pushes the telescope's mount to aim towards a particular celestial object. These are called "push-to" or "shove-to" mounts. As with a go-to mount, the user must supply time and location data to a hand-held computer before the observing session, and aim at two or three bright stars. Once the computer knows where and when, it provides a digital readout to the observer to help find the way to a selected object. Because they don't use motors, push-to mounts are low-cost alternative to go-to mounts for large telescopes like Dobsonians. Push-to telescopes include the Intelliscope series by Orion and other variations.



LEFT: A Dobsonian reflector with a "push-to" mount and hand-held computer

A word about the wise use of go-to and shove-to mounts...

Go-to and shove-to telescopes are no substitute for learning your own way around the sky. Beginning astronomers who use go-to telescopes to hop from object to object like they're flipping channels on a television are bound to lose interest in astronomy in just a few nights. The pleasure of amateur astronomy comes not from mindless sightseeing, but from gaining your own understanding, using your imagination, and enjoying the occasional feeling of pride and accomplishment when you find and understand a new sight in the night sky.



NASA successfully hurled an object into an asteroid at 14,000 mph to see if it could be knocked off course.

The James Webb telescope took a detailed image of the impact site.



Cover Image - The Statue of Liberty

by Gerald de Beer



This nebula complex located in the Carina Arm of Milky Way, between Eta Carinae and Running Chicken Nebula.

There are two parts of the image. On the right side, there is an active star forming region around 9000 light years away, where strong stellar winds from the embedded young, massive stars shape two huge filaments resembling the curled horns of a ram. the nebula "Statue of Liberty Nebula" is located around 9000 light years away. At the center of the object we can see an interesting shape resembling the famous Statue of Liberty. This is where the name of the nebula comes from.

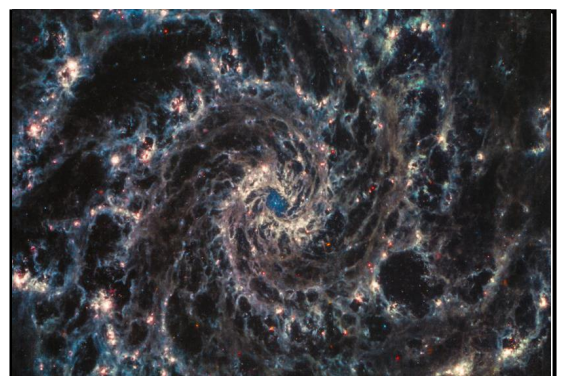
Tech Specs:

Telescope: Astro-Tech 127EDT Triplet Refractor
Mount: Skywatcher EQ6-R Pro on a steel pier
Focuser: Sesto Senso 2 Robotic Focuser
Camera: ZWO ASI2600MM Pro Cooled camera
Filters: Ha : 25 x 240" (1h 40') (gain: 100) @ -10°C
 Sii : 25 x 240" (1h 40') (gain: 100) @ -10°C
 Oiii: 25 x 240" (1h 40') (gain: 100) @ -10°C

Calibration: Matching Flats, Darks and Dark flats

Integration Time: 5 hrs

Software: N.I.N.A Image Capture Software
 PixInsight Process Software in the SHO
 Hubble false colour palette.



INDEX PAGE

James Webb Space Telescope's (JWST) stunning new image of a spiral galaxy, showing the spectacular "Phantom Galaxy" (also called M74 and NGC 628),



NASA's DART - Successful Asteroid Impact Test

For the first time in history, NASA is changing the motion of a natural celestial body in space. Now that a spacecraft successfully has hit the asteroid Dimorphos — the science is just getting started.

To survey the aftermath of the impact, the European Space Agency's Hera mission will launch in 2024. The spacecraft, along with two CubeSats, will arrive at the asteroid system two years later.

Hera will study both asteroids, measure physical properties of Dimorphos, and examine the DART impact crater and the moon's orbit, with the aim of establishing an effective planetary defense strategy.

Days, weeks and months after, will show images and video captured by the Italian satellite that observed the collision event as it flew past Dimorphos, capturing images and videoing the impact. The first images received back from LICIAcube showed the moment of impact and the plume it created.

Observations of the DART spacecraft colliding with Dimorphos, was captured by the Asteroid Terrestrial-Impact Last Alert System. Credit - ATLAS Project. Which can be seen here: https://vp.nytimes.com/video/2022/09/27/102639_1_27asteroid-vid_wg_720p.mp4



ABOVE: Four images taken by the LICIAcube, a spacecraft that trailed DART to take before-and-after photos of Dimorphos. Credit: ASI/NASA

planetary science at Northern Arizona University and the lead of the observations working group for the mission.

NASA's DART spacecraft recorded pictures up to just before the very moment it slammed into an asteroid on Monday at more than 14,000 miles per hour; but not of the impact nor the aftermath.

Astronomers on Earth with telescopes, seven million miles away, were watching. The images they recorded revealed a spectacular outburst of debris rising from the asteroid after the collision.

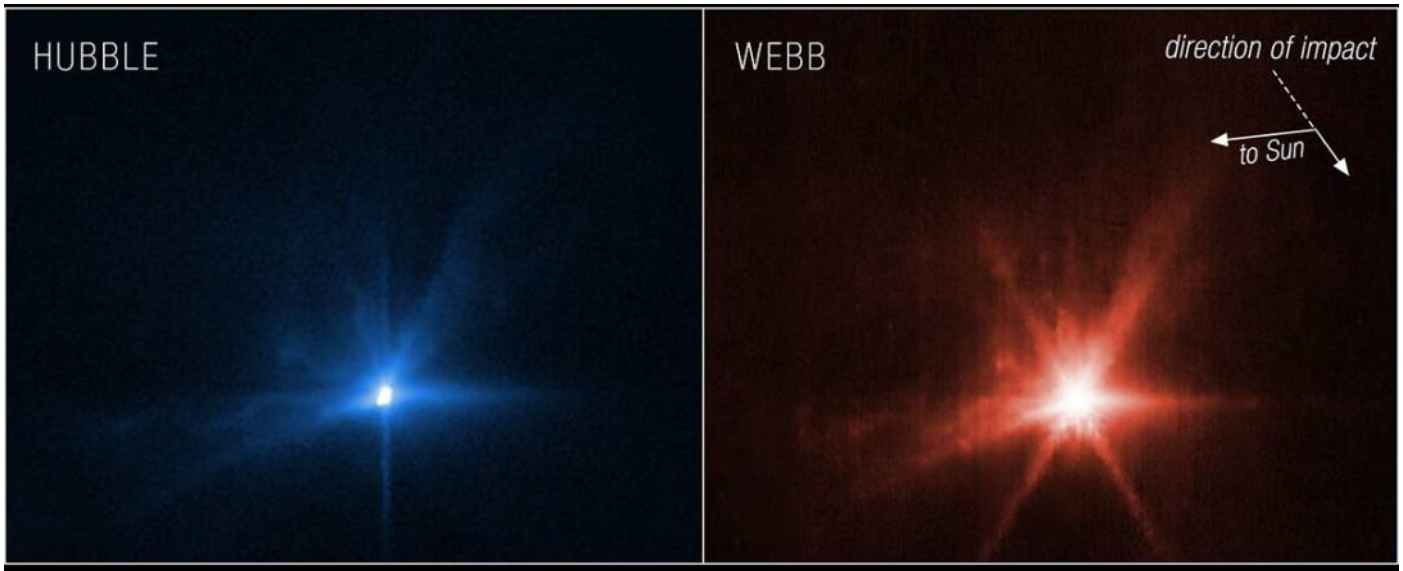
The celestial show was a bonus to the spacecraft's main objective of demonstrating a method for defending the planet from deadly space rocks in the future.

"I saw the ground-based images in the minutes after impact, and they were absolutely phenomenal," said Cristina Thomas, a professor of astronomy and

...DART Impact

The LICIACube wasn't the only observer watching the impact on Dimorphos on the 26th September 2022. The James Webb Space Telescope, the Hubble Space Telescope and NASA's Lucy mission all observed the impact.

ABOVE: Images taken by the James Webb Space Telescope, the Hubble Space Telescope of the asteroid Didymos impact.



Take, for example, the sequence depicted was captured with a 20-inch telescope in South Africa. It shows the asteroid Didymos, about half a mile wide, moving across the night sky. What cannot be seen is Dimorphos, the 500-foot-wide moon of Didymos — and the target of DART.

“Our telescope in South Africa — we simply pointed in the direction of the asteroid,” John Tonry, a professor of astronomy at the University of Hawaii, said. “And we started taking images every 40 seconds.

The sudden brightening comes from a cloud of debris tossed into space by the impact of the spacecraft into Dimorphos. “We didn’t really expect to see such a big plume of dust coming out,” Dr. Tonry said. “But, you know, discovery favors the prepared.”

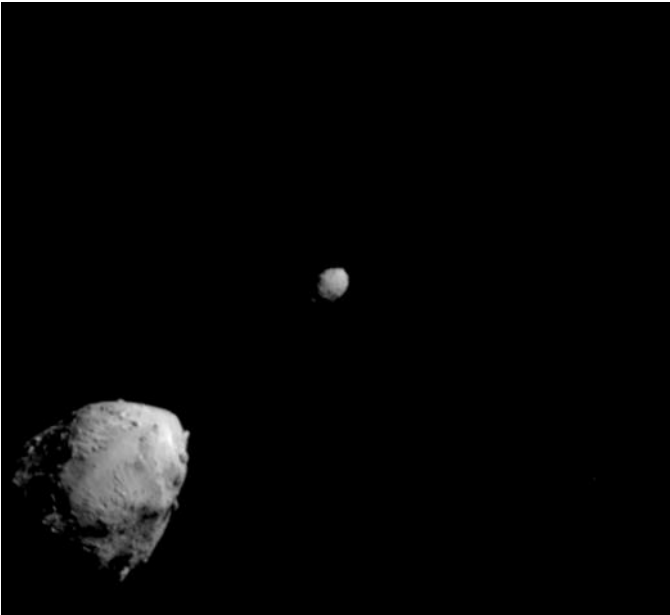
Right after the impact, the brightness jumped by a factor of 10 from sunlight bouncing off the debris. It has dimmed since then, but the dot is still four times as bright compared with what it was. A cloud of slower moving debris that remains in the vicinity of Didymos and Dimorphos is likely to fall back to the surfaces of the two asteroids in the coming weeks.

A [similar sequence of images](#) was taken by another telescope in South Africa by Amanda Sickafoose, an astronomer who lives in South Africa but works for the Planetary Science Institute based in Tucson, Ariz., and Nicolas Erasmus of the South African Astronomical Observatory. (South Africa was a prime location for viewing the impact.)

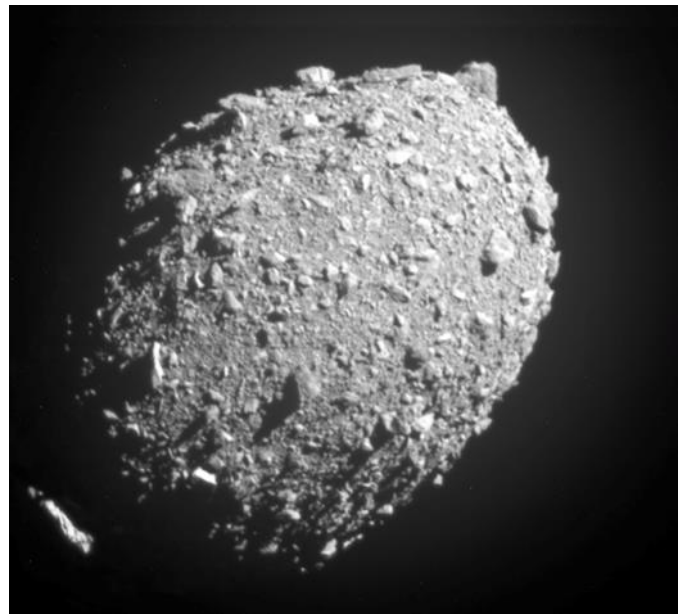
“Seeing the ejecta was phenomenal,” Dr. Sickafoose said. “I feel like I might never have the opportunity to see something like that again in my life.”

...DART Impact

The final five-and-a-half minutes of images leading up to the DART spacecraft's intentional collision with asteroid Dimorphos. The DART spacecraft streamed these images from its DRACO camera back to Earth in real time as it approached the asteroid. This replay movie is 10 times faster than reality, except for the last six images, which are shown at the same rate that the spacecraft returned them. Both Didymos and its moonlet Dimorphos are visible at the start of the movie. At the end, Dimorphos fills the field of view. The final image in the movie shows a patch of Dimorphos that is 51 feet (16 meters) across. DART's impact occurred during transmission of the final image to Earth, resulting in a partial picture at the end of this movie. Didymos is roughly **2,500 feet (780 meters) in diameter**; **Dimorphos is about 525 feet (160 meters) in length**.
Credits: NASA/Johns Hopkins APL



Asteroid Didymos (bottom left) and its moonlet, Dimorphos, about 2.5 minutes before the impact. The image was taken by the on board DRACO imager from a distance of 570 miles (920 Kms).



Asteroid moonlet Dimorphos as seen by the DART spacecraft captured 11 seconds before impact from a distance of 42 miles (68 Kmss).



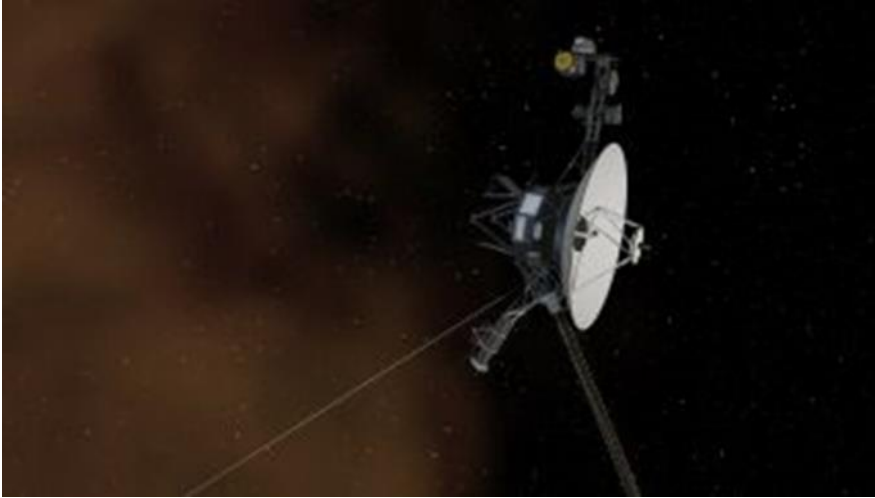
The last complete image of asteroid moonlet Dimorphos, taken from ~7 miles (12 kms) from the asteroid and 2 seconds before impact.



DART's final look at the asteroid moonlet Dimorphos before impact, taken at ~4 miles (~6 Kms) from the asteroid and only 1 second before impact.



After 45 years, the 5-billion-year legacy of the Voyager 2 interstellar probe is just beginning



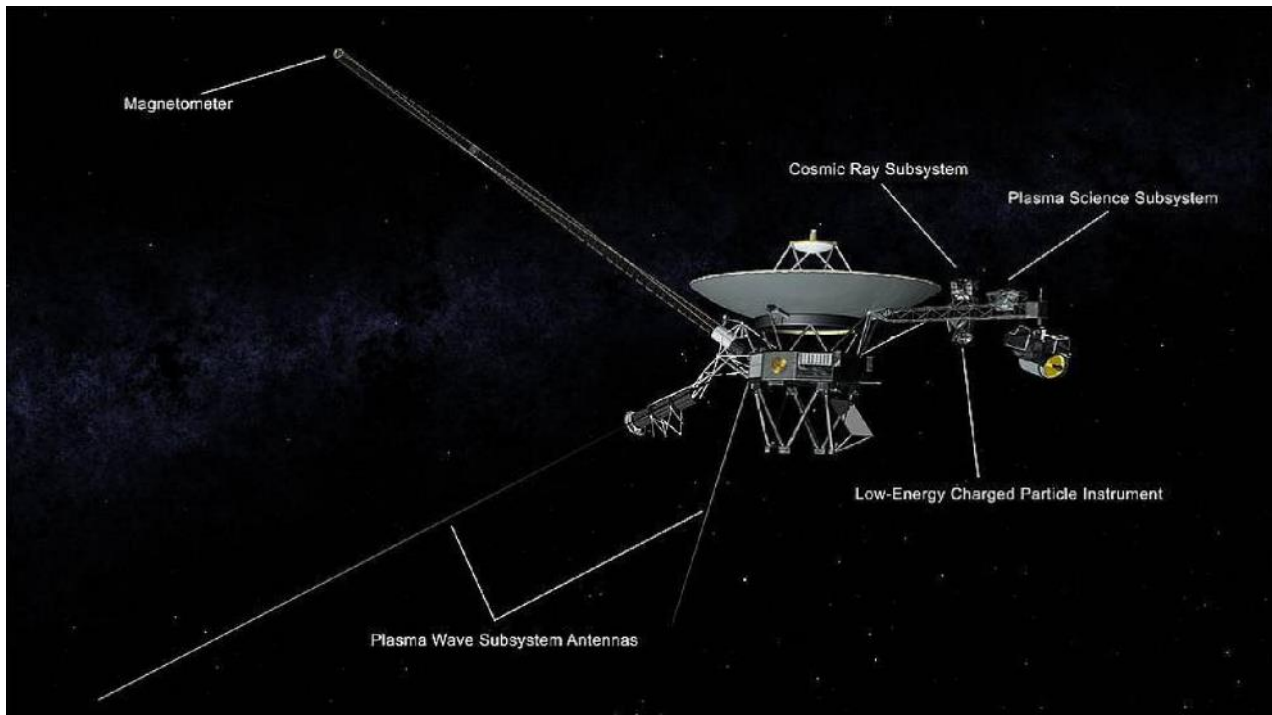
ABOVE: An artist's depiction of a Voyager spacecraft. (Image credit: NASA / JPL)

On Aug. 20, 1977, 45 years ago, an extraordinary spacecraft left this planet on a journey like no other. [Voyager 2](#) was going to show us, for the first time, what the outer solar system planets looked like close-up. It was like sending a fly to New York City and asking it to report back.

Despite its name [Voyager 2](#) launched before [Voyager 1](#), when it lifted off from Cape Canaveral Space Launch Complex 41 aboard a Titan IIIE-

Centaur on Aug. 20, 1977. Voyager 1 followed suit two weeks later on Sept. 5 1977. Attached to the flank of each Voyager was a Golden Record carrying greetings, sounds, images and music from Earth.

The spacecraft were more or less twins, but they had different trajectories and scientific instruments. While both flew by [Jupiter](#) and [Saturn](#), Voyager 1 then sped onwards to interstellar space. Voyager 2 tarried to make the only visit ever to the ice giants, [Uranus](#) and [Neptune](#).



Gallery: [Celebrate 45 years of Voyager with these amazing images of our solar system](#)

...Voyager 2

The Many-Colored Worlds



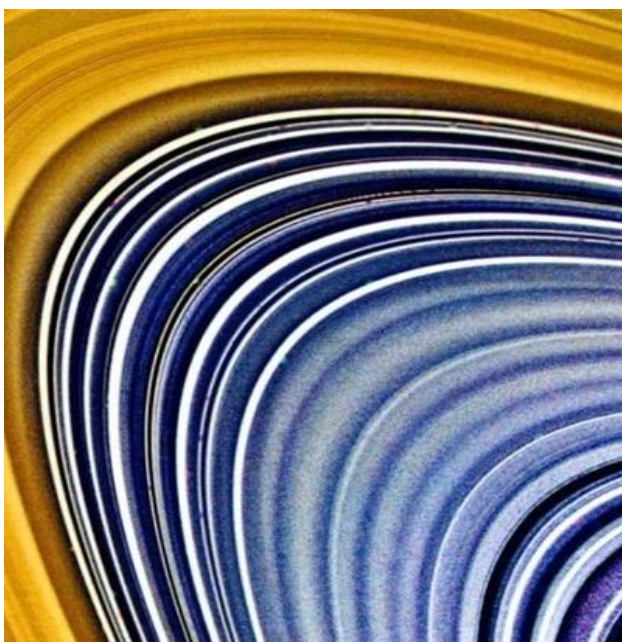
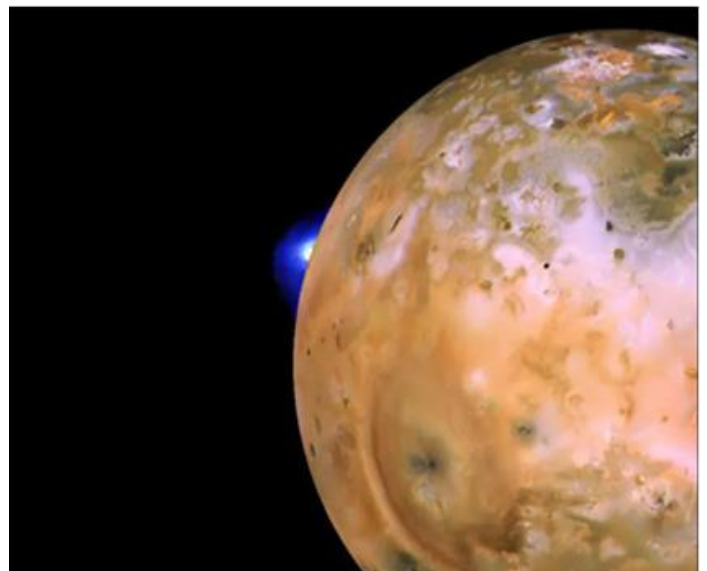
The probes spotted volcanoes on Jupiter's moon [Io](#), discovered that Jupiter's [Great Red Spot](#) is an Earth-size storm and found that the gas giant has faint rings.

Image right of Jupiter's moon Io showing the active plume of the volcano Loki. The heart-shaped feature southeast of Loki consists of fallout deposits from the active plume Pele. The images that make up this mosaic were taken in July 1979 from an average distance of approximately 340,000 miles (490,000 kilometers) from the moon.

Voyager 2 moved onto Jupiter 4 months after Voyager 1 and picked up the baton in late April continuing into August.

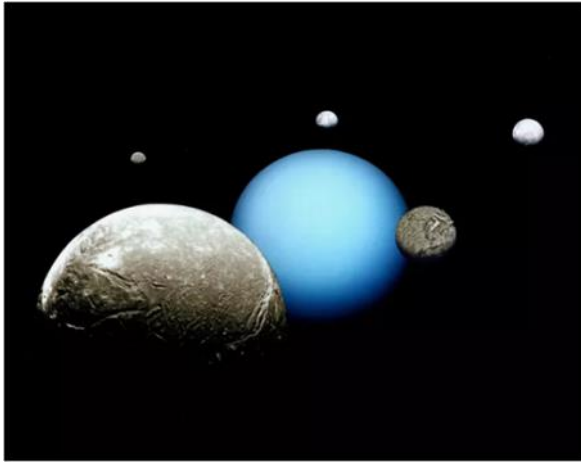
Together there was more than 33,000 pictures of Jupiter and its five major satellites. Among its most spectacular findings were pictures from the icy moon Europa.

Voyager 2 snapped detailed photos of the icy moon's cracks from 128,000 miles (205,996 km) away and revealed no change in elevation anywhere on the moon's surface.



Next in line was Saturn. Voyager 2 became the third spacecraft to visit Saturn when it arrived at its closest point to the ringed planet on Aug. 26, 1981, and took hundreds of pictures of the planet, its moons and its rings. Suspecting that Saturn might be circled by many ringlets, scientists conducted an experiment. They watched the star Delta Scorpii for nearly two and a half hours as it passed through the plane of the rings. As expected, the star's flickering light revealed ringlets as small as 330 feet (100 meters) in diameter. This Composite image of Saturn's C-ring captured by the Voyager 2 spacecraft when it was 1.7 million miles (2.7 million kilometers) away from the gas giant.

...Voyager 2



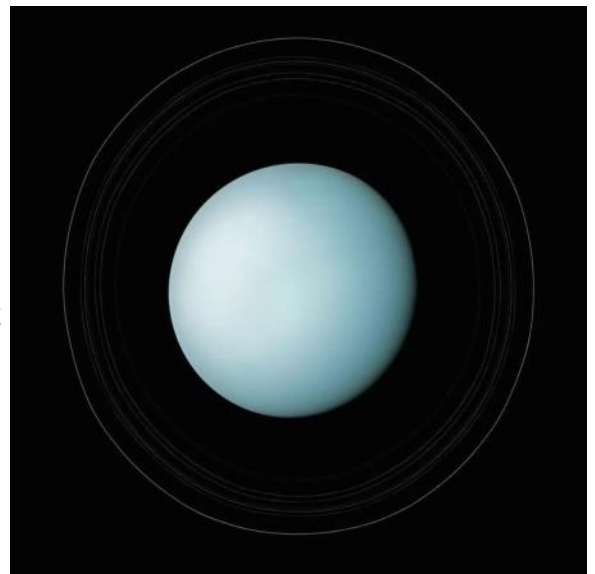
Uranus and its five major moons are depicted in this montage to the left, of images acquired by the Voyager 2 spacecraft. The moons, from largest to smallest as they appear here, are Ariel, Miranda, Titania, Oberon and Umbriel.

Voyager 2's made its closest approach to Uranus, coming within 81,800 kilometers (50,600 miles) of Uranus's cloud tops on Jan. 24, 1986. Also becoming the first spacecraft to visit the ice giant. The probe made several observations of the planet, noting that the south pole was facing the

sun and that its atmosphere is about 85% hydrogen and 15% helium.

Additionally, Voyager 2 discovered thin rings around Uranus, and hint that the planet could have even more moons in orbit. It discovered 10 new moons and a magnetic field that, oddly, was 55 degrees off the planet's axis. Astronomers are still puzzling over Uranus' orientation today.

Voyager 2's pictures of the moon Miranda revealed it to be perhaps the strangest moon in the solar system. Its jumbled-up surface appears as though it was pushed together and broken apart several times.



It mapped pale blue-green clouds and a possible "dark spot," which was later confirmed by the Hubble Space Telescope. There was an unexpected magnetic field, which dragged a corkscrew trail of particles behind the planet as it rolled in its orbit. Ten new moons were discovered, including the grey, cratered Puck, shown right and two new coal-black rings.

The moons of Uranus may have formed from the collision that knocked the planet over on it's side. Material from the two [colliding] bodies is ejected in a debris disk, and finally satellites are formed from the debris disk It is possible to explain the axial



tilt and the formation of the regular satellites of Uranus simultaneously."

...Voyager 2



Voyager 2 reached Neptune and sent home images of teal and cobalt clouds swirled by winds up to 11,000 mph (18,000 kph). A slate-colored "great dark spot" indicated a storm the diameter of Earth.

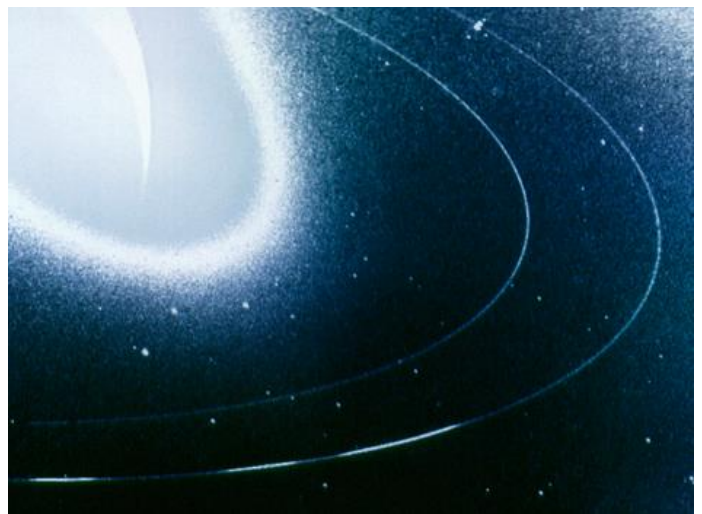
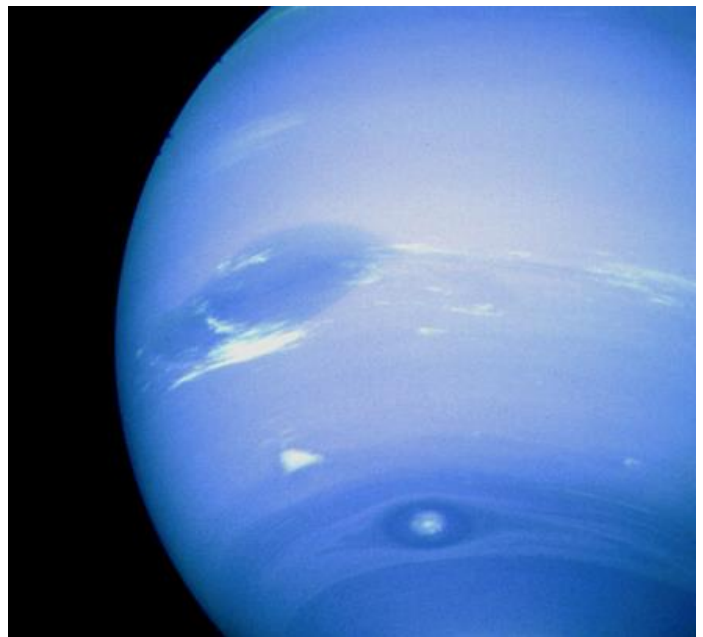
The largest moon, Triton, was blushed pink from methane ice and spouted geysers of frozen nitrogen.



Neptune was also discovered to have rings and many more moons than scientists initially thought. It also got to see Triton, a geologically active moon that is orbiting "backward" and, like Pluto, is now believed to be a captured dwarf planet from the Kuiper Belt, shown Left.

In the August of 1989, NASA's Voyager 2 became the first spacecraft to observe the planet Neptune, its final planetary target. Passing about 4,950 kilometers (3,000 miles) above Neptune's north pole, Voyager 2 made its closest approach to any planet since leaving Earth 12 years ago.

Five hours later, Voyager 2 passed about 40,000 kilometers (25,000 miles) from Neptune's largest moon, Triton, the last solid body the spacecraft will have an opportunity to study.



No spacecraft has been back since.

...Voyager 2

Messages to the Future



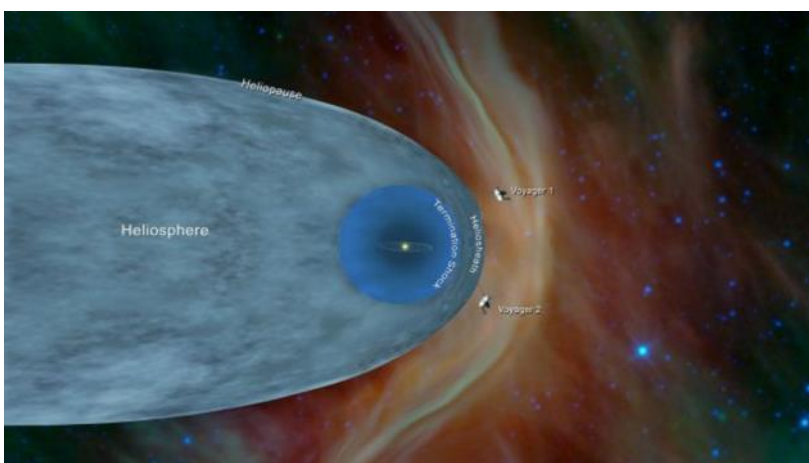
Even more than these glimpses of the far icy planets, what fascinates people about the Voyager mission is the famous Golden Records. A committee led by visionary astronomer Carl Sagan worked for over a year to assemble materials to represent planet Earth. The music garners the most attention as the "mix tape for the universe," but it's not the only highlight.

One of the sounds of Earth is the manufacture of stone tools, or "knapping." This is the most durable technology humans and their ancestors have devised, in use [from around 3 million years](#) ago to the present day. For most of human existence, the sound of stone striking stone to detach a sharp-edged cutting flake was heard daily in every community. On the record, you can hear the thuds of stone against the sound of heartbeats.

In one of the 116 images, a Black scientist in a lab coat bends over a microscope, tiered earrings falling gracefully from her ears. The earrings were the subject of some debate: would a future alien viewer recognize the concept of "jewellery"? It was hoped this image, together with the photomicrograph([opens in new tab](#)) of cells dividing, would help viewers figure out that the science of microscopy was known on our planet.

People recorded messages in 55 languages([opens in new tab](#)). Some are ancient languages, such as Akkadian([opens in new tab](#)) and Hittite, not heard on Earth for thousands of years. The most common words used are "greetings," "peace" and "friend." The Portuguese greeting, spoken by Janet Sternberg, says simply "Peace and happiness to all."

The Long Farewell



Finally, on November 5, 2018, Voyager 2 joined Voyager 1, crossed the outer edge of our solar system beyond the heliopause, where the solar wind is turned back by winds from interstellar space. Our galaxy is 100,000 light-years across, and Voyager 2 is now approximately 12 billion miles (19 billion kilometers) away from Earth and counting!

But Voyager 2 is destined to roam the Milky Way long after its instruments have stopped working. In about 40,000 years Voyager 2 will pass 1.7 light-years (9.7 trillion miles) from the star Ross 248, according to NASA JPL. The cosmic vagabond will continue its journey through interstellar space and pass 4.3 light-years, (25 trillion miles) from Sirius in about 296,000 years. Both spacecraft send reedy signals that wend their way between the planets to the three antennas which are still listening: Tidbinbilla, Goldstone and Madrid.



ASSA Durban Minutes of General Meeting

14 September - 19:30 via Zoom



1. Welcome

- x Members of JHB and guests from KZN were welcomed by Carmel Ives at 19:30
- x Zoom sharing by Gerald de Beer, and the meeting was recorded.

2. Speaker

- x Piet Strauss introduced the guest speaker Prof Matt Hilton, who spoke about the James Webb Telescope **Durban Meeting (online only)**

3. Present and Apologies

- x 14 members attended. AR chaired the meeting.
- x Apologies from Moya, Rowen

4. Confirmation of previous meeting minutes

- x Proposed: Piet Strauss
- x Seconded: Claire Odhav

5. Matters arising

- x None

6. Treasurer's Report

- x Treasurer report prepared by Corinne, and presented by Francois

ASSA DURBAN FINANCIALS

2022/09/14



Financials Meeting	Month	Current	Investment	Petty Cash
General Meeting	2022-09-14	R 32 804,87	R62 673.61	R 1 000,00

ASSA DURBAN - MEMBERS

Date	No off	Paid Members	Honoury	Unpaid
2022-09-14	139	63	4	72

ASSA DURBAN - RESIGNED

SURNAME	First Name	Title	Type	No off
Ainsworth / Alder	Howard & Laurienne	Couple	Family	2

- x Debbie Abel offered to take over duties of financial officer

...Minutes of the Meeting

7. Library

- x Library can be visited once we have access to the school again for meetings, as well as during viewing nights.

8. Events

- x Amith Rajpal hoping to get funding for viewing events with local schools. Volunteers needed with scopes.
- x Sutherland Trip: Deposits will hopefully be returned soon, except Mango refunds may be delayed. All monies received will be refunded, and not kept for a future trip. Records of payments are known, but proof of payments will help for speedy repayments. Please send bank details to Piet Strauss.
- x Member Meeting Facilities/Options: We will continue with online (Zoom) meetings for the benefit of remote members, even after we start meeting in person again. Gerald is happy to continue hosting the Zoom meetings

9. General

- x School is in exam phase, so we will only have access to rooms in time for the year-end function. Until then, meetings will continue on Zoom.
- x Corinne requested an updated viewing roster to add to nDaba
- x Fiona Khan to take over 'nDaba after October issue
- x Next General meeting on **Wednesday 12 October @ 19:30**

ASSA JHB ZOOM MEETING

<https://us02web.zoom.us/j/84938085868?>

pwd=ZmtsS0x4WWhwQ3c0UXR0Rnp3YS9QQT09

Meeting ID: 849 3808 5868

Passcode: Starlight

ASSA DURBAN ZOOM MEETING

Durban members meeting continues.

Meeting ID: **88037701479**

Passcode: **297674**





Public Viewing Roster ASSA Durban



Dome Master	Email	Assistant	Telescope Volunteer	Public Viewing
TBC				

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.

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

Notice Board

MEETINGS:

- GENERAL MEETING to be held on **14 September 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, please 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.sao.ac.za/about/publications/nightfall/

MEMBERSHIP FEES & BANKING:

- **Membership Subscriptions were due on the 2022-07-01 for the 2022-2023 financial year. PLEASE pay outstanding subscriptions.**
- **Please pay Subscription fees via EFT.**



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 2023 - Limited number will be available !!!

- SKY GUIDES **Sill to be published**

RESIGNATIONS from ASSA:

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

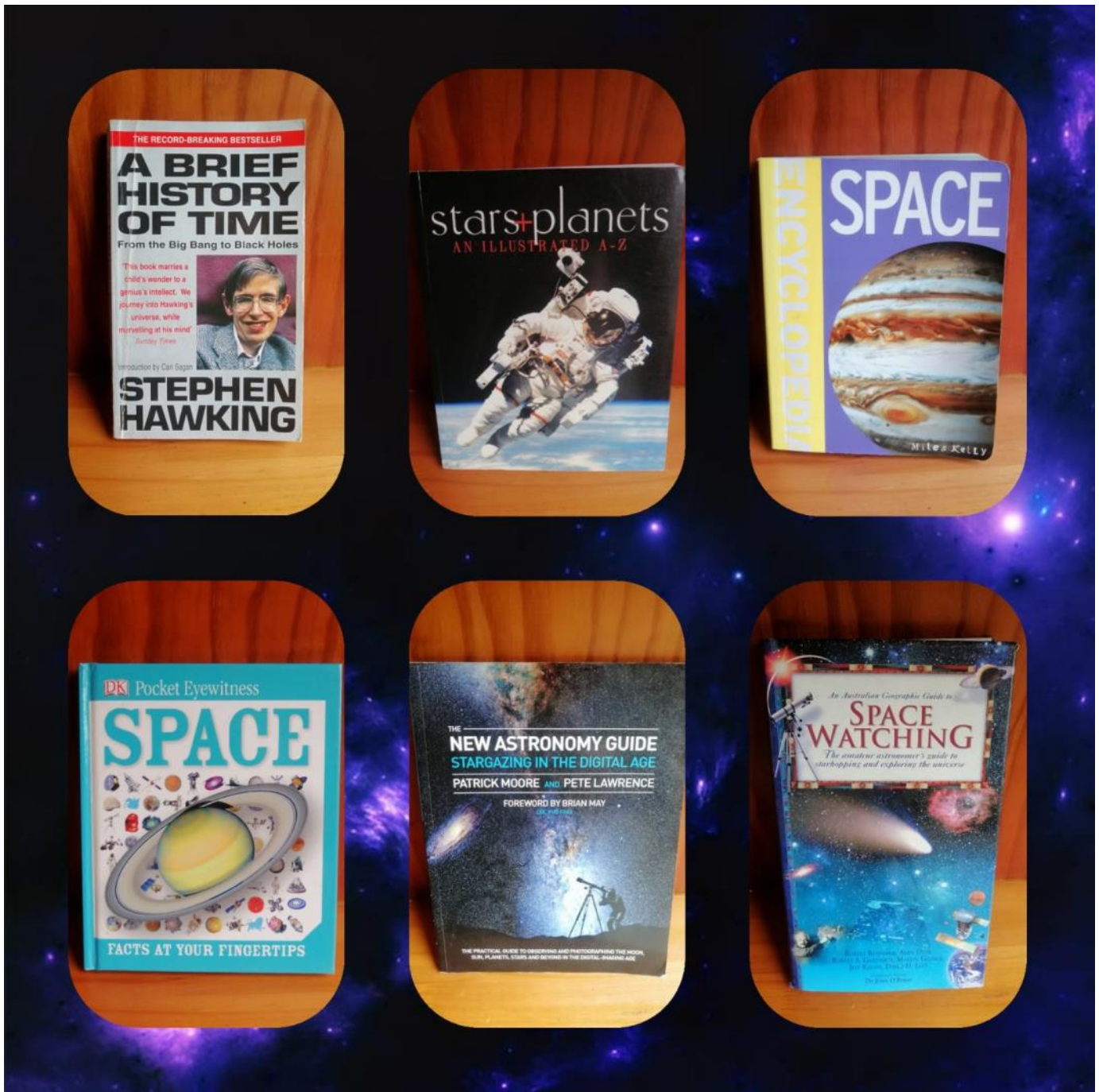
COMMITTEE POSITIONS & CONTACTS:

• 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	John & Corinne Gill	John@astronomydurban.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>

Space Books Available



Astronomy books for sale:

(Combination of new and pre-loved)

For teens, adults, and amateurs:

- R210 – Space Watching (Hardcover)
- R120- Stars and Planets A-Z
- R95- Space Facts at Your Fingertips (DK)
- R100- Mini Space Encyclopedia (MK)
- R110- New Astronomy Guide (Patrick Moore)
- R95- A Brief History of Time (Stephen Hawking)

If interested, please WhatsApp :

Claire on 0833955160