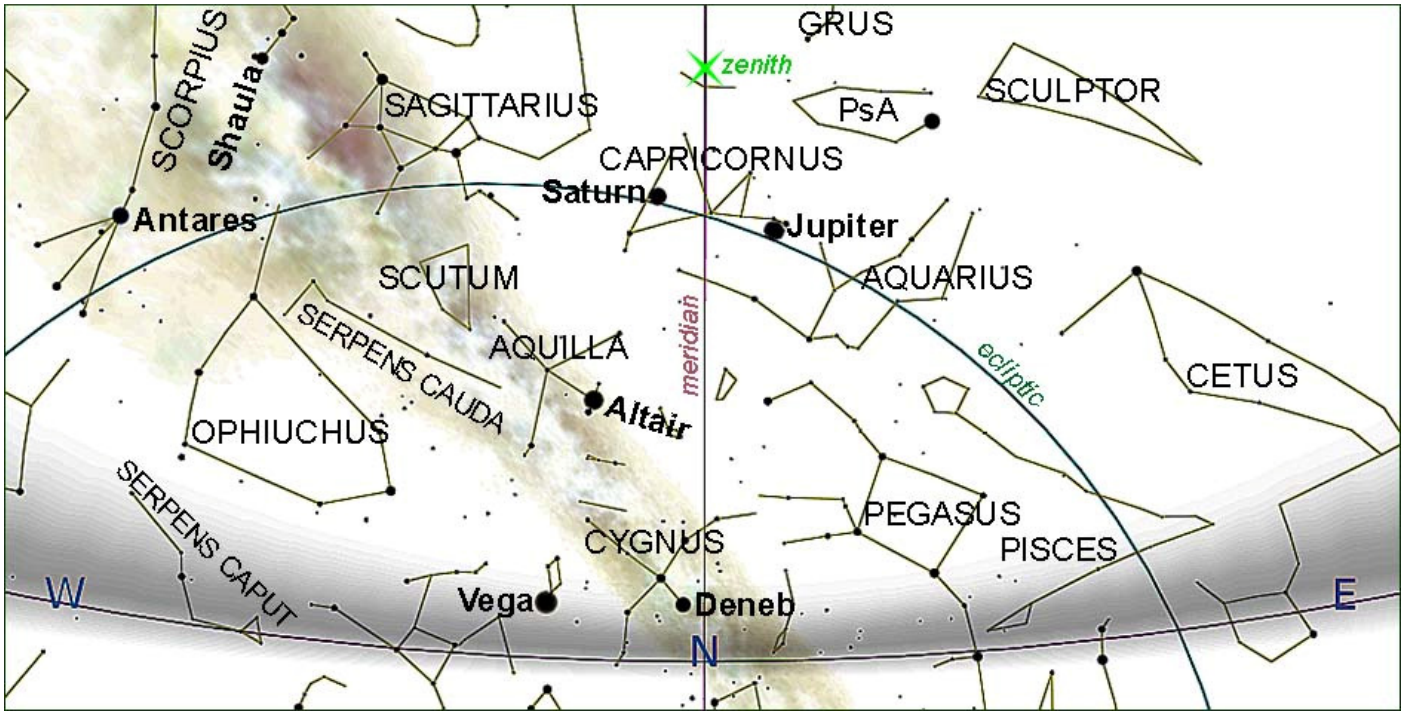
SKYNOTES from Hermanus

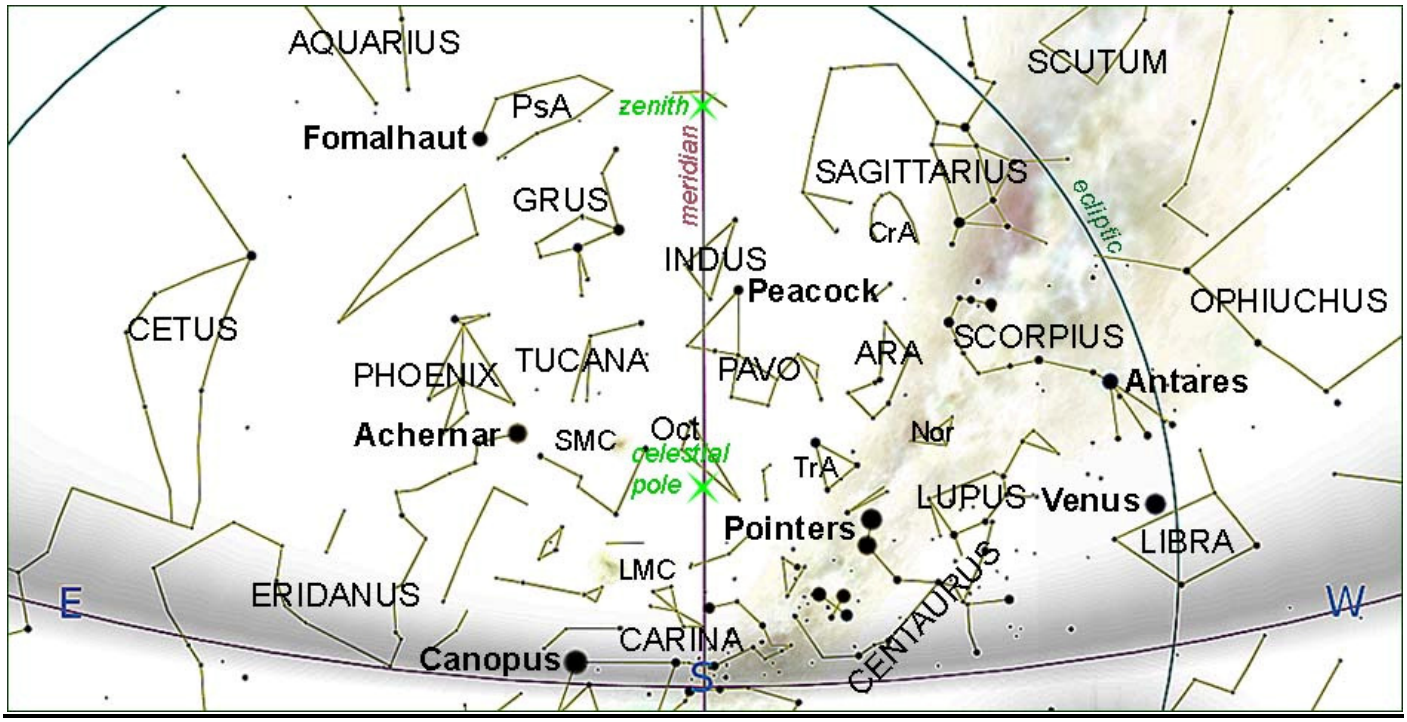
OCTOBER 2021

1. SKY CHARTS

EVENING SKY 2nd OCTOBER at 21h00 (NORTH DOWN)



EVENING SKY 2nd OCTOBER at 21h00 (SOUTH DOWN)



2. THE SOLAR SYSTEM

PLEASE NOTE: All events predicted are as observed from **Hermanus, Western Cape, South Africa. Times are South African Standard Time (UTC +2).**

HIGHLIGHTS FROM THE SKY GUIDE - October 2021

Date	*Time*	*Item*
1	19h15	**Mercury** 1.5º south of **Spica** (α Vir)
4 to 10		*WORLD SPACE WEEK* [1]
6	13h05	**New Moon**
		Pluto stationary
8	19h29	**Moon** at perigee (363 387 km)
	05h50	**Mars** at conjunction
9	22h06	**Moon** 3.4º west of **Venus** in the setting claws of Scorpius
	21h35	**Moon** at descending node *
	18h12	**Mercury** at inferior conjunction
10		**Moon**, **Venus** and **Antares** (α Sco) grouped on the western horizon
11		**Saturn** stationary
12	11h09	**Moon** southernmost (-26.2º)
13	05h25	**First quarter Moon**
14		**Moon** near **Saturn** and **Jupiter** in Capricornus
16		**Venus** near **Antares** (α Sco)
18		**Mercury** stationary
		Jupiter stationary
20	16h57	**Full Moon**
23		**Moon** at ascending node *
24	17h31	**Moon** at apogee (405 614 km)
25	06h59	**Mercury** at maximum western elongation (18.4º)
26	18h04	**Moon** northernmost (+26.3º)
28	22h05	**Last quarter Moon**
29	23h59	**Venus** at maximum eastern elongation (47º)
31		*DARK MATTER DAY* [2]

[1] *WORLD SPACE WEEK* - an annual celebration observed from October 4 to 10 in over 95 nations throughout the world. World Space Week is officially defined as "an international celebration of science and technology, and their contribution to the betterment of the human condition". https://en.wikipedia.org/wiki/World_Space_Week

SANSA (Hermanus) are celebrating World Space Week. Please see the attached press release.

[2] *DARK MATTER DAY* - On and around 31st October 2021, the world will celebrate the historic hunt for the unseen—something that scientists refer to as *dark matter*. https://www.google.com/search?client=firefox-b-d&q=dark+matter+day

* ASCENDING NODE – in the orbit of a solar system body, the point where the body crosses the ecliptic from south to north. DESCENDING NODE - in the orbit of a solar system body, the point where the body crosses the ecliptic from north to south. *[from the glossary of the Sky Guide Africa South]*

OCTOBER 2021			*1st October*	*1st November*	*Visibility*
Sun Length of day	Virgo to Libra 12:26 to 13h30	Rises:	06h20	05h42	***Never look at the sun without SUITABLE EYE PROTECTION!***
		Transit:	12h33	12h27	
		Sets:	18h46	19h12	
Mercury Magnitude Phase Diameter	Virgo 0.0 to -0.8 16% to 80% 10” to 6”	Rises:	06h49	05h05	**Low in the west after sunset to low in the east before sunrise**
		Transit:	13h26	11h28	
		Sets:	20h03	17h51	
Venus Magnitude Phase Diameter	Libra to Ophiuchus -4.2 to -4.4 62% to 48% 19” to 26”	Rises:	08h20	08h17	**Evening**
		Transit:	15h23	15h42	
		Sets:	22h27	23h08	
Mars Magnitude Phase Diameter	Virgo +1.7 to +1.6 100% 4”	Rises:	06h30	05h22	**Too close to the Sun**
		Transit:	12h42	11h56	
		Sets:	18h54	18h31	
Jupiter Magnitude Diameter	Capricornus -2.7 to -2.5 46” to 42”	Rises:	14h58	12h56	**Evening**
		Transit:	21h42	19h40	
		Sets:	04h30	02h28	
Saturn Magnitude Diameter	Capricornus +0.5 to +0.6 18” to 17”	Rises:	13h41	11h41	**Evening**
		Transit:	20h38	13h38	
		Sets:	03h40	01h39	
Uranus Magnitude Diameter	Aries +5.7 to +5.6 4”	Rises:	21h28	19h21	**Throughout the night**
		Transit:	02h50	00h44	
		Sets:	08h08	06h03	
Neptune Magnitude Diameter	Aquarius +7.8 2”	Rises:	17h16	15h10	**Evening**
		Transit:	23h30	21h35	
		Sets:	05h48	03h44	
Pluto Magnitude	Sagittarius +14.3 to +14.4	Rises:	12h37	10h36	**Evening**
		Transit:	19h47	17h45	
		Sets:	03h00	00h58	

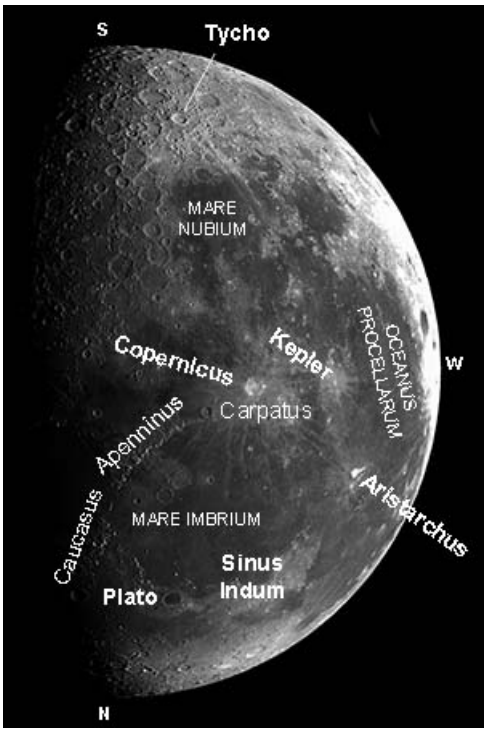
Phase: In a telescope, the inner planets (Mercury, Venus and Mars) appear to us in phases, depending on the angle of the Sun’s illumination, as does the Moon. The **angular diameter** is given in arc seconds (“). This is the apparent size of the object as we see it from Earth.

Magnitude: we are accustomed to hearing stars described in terms of ‘magnitude’. For example the planet Jupiter at magnitude -1.8 is considerably brighter than the star Antares (in Scorpius) at +1.05. The scale is ‘inverse’; the brighter the object, the lower the number. A ‘good’ human eye on a clear night can see down to a magnitude of about +6.

Transit: When an object crosses the **local meridian** it is said to **‘transit’**. The local meridian is an imaginary line from the horizon directly north passing overhead (through *zenith,* see charts on page 1) to the horizon directly south.

THE MOON

Last Quarter



With the frustrating scarcity of cloudless *and* moonless evenings for stargazing, we do occasionally have the option to take a look at the moon. Most of us are reasonably familiar with the eastern half of the moon (first quarter) so, presented here, we have the last quarter for a change. It does involve staying up a bit later but, with warmer weather on the way, why ever not?

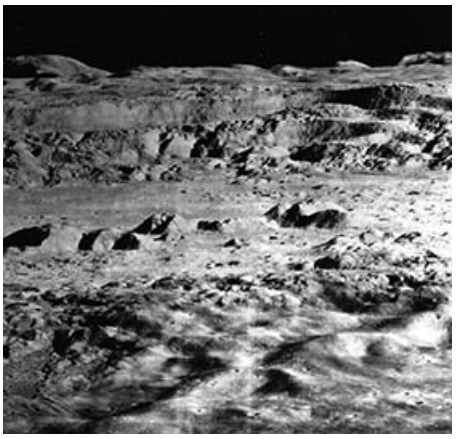
Mare Imbrium ("Sea of Rains"), clearly defined and almost circular, is one of the solar system's largest craters with a diameter of 1145 km. The actual basin, with a diameter of 1300 km, in which the mare is embedded, is sharply delineated to the south by **Montes Carpatus**, in its south-eastern quarter by the mountain range **Montes Apenninus** and in the east by **Montes Caucasus**. The western and northern limits, comprising mountainous regions near craters **Aristarchus**, **Sinus Indum** and **Plato**, are less well developed. The basin is thought to be the result of a collision with a proto-planet some 250 km in diameter during the Late Heavy Bombardment of about 3.9 billion years ago. Basaltic lava later flooded the giant crater to form the flat volcanic plain seen today.

Also worthy of note, and visible in binoculars, are the "big splash" craters **Tycho**, **Kepler** and **Copernicus.** [*those three people did indeed make a big splash!*]

Tycho – in a densely cratered area, some of which are actually secondary craters resulting from ejecta from the Tycho impact. The crater diameter is 85 km, depth 4 800 metres (the highest peak on the Drakensberg is 3 482 metres; Meteor Crater in Arizona is 170 metres deep); central peaks rise 1600 metres above the floor. The ray system radiates to about 1 500 km, visibly bisecting Mare Serenitatis in the north-east quadrant of the visible moon. Further reading - https://en.wikipedia.org/wiki/Tycho_(lunar_crater) Due to its prominent rays, Tycho is mapped as part of the Copernican System.

Kepler – Again, owing to its prominent rays extending over 300 km, Kepler is mapped as part of the Copernican System. One of the rays from Tycho, extending across eastern **Oceanus Procellarum** ("Ocean of Storms"), intersects this crater. Kepler has a small rampart of ejecta surrounding the exterior of its high rim. The outer wall is not quite circular, and possesses a slightly polygonal form. The interior walls of Kepler are slumped and slightly terraced, descending to an uneven floor and a minor central rise. https://en.wikipedia.org/wiki/Kepler_(lunar_crater)

Copernicus – a lunar impact crater located in eastern Oceanus Procellarum. It was named after the astronomer Nicolaus Copernicus. It typifies craters that formed during the Copernican period in that it has a prominent ray system. It may have been created by debris from the breakup of the parent body of asteroid 495 Eulalia 800 million years ago. Due to its relative youth, the crater has remained in a relatively pristine shape since it formed. The circular rim has a discernible hexagonal form, with a terraced inner wall and a 30 km wide, sloping rampart that descends nearly a kilometer to the surrounding mare. There are three distinct terraces visible and arc-shaped landslides due to slumping of the inner wall as the crater debris subsided.



"Picture of the Century" – oblique view of the interior of Copernicus from Lunar Orbiter 2, which orbited the Moon from 1966 to 1967. NASA photo.

Lunar and Solar eclipses: none predicted for this month

The following table is included as an aid to the planning of observation evenings:

MOON RISE AND SET TIMES FOR OCTOBER

Day	*date*	*rise*	*set*	*Day*	*date*	*rise*	*set*	*Day*	*date*	*rise*	*set*
Fri	Oct/01	03h34	13h24	Tue	Oct/12	10h46	00h47	Sat	Oct/23	21h57	07h21
Sat	Oct/02	04h16	14h27	Wed	Oct/13	11h50	01h48	Sun	Oct/24	22h55	07h56
Sun	Oct/03	04h52	15h32	Thu	Oct/14	12h56	02h40	Mon	Oct/25	23h50	08h36
Mon	Oct/04	05h26	16h38	Fri	Oct/15	14h01	03h23	Tue	Oct/26	---	09h22
Tue	Oct/05	05h58	17h45	Sat	Oct/16	15h06	04h01	Wed	Oct/27	00h42	10h14
Wed	Oct/06	06h29	18h53	Sun	Oct/17	16h07	04h33	Thu	Oct/28	01h29	11h10
Thu	Oct/07	07h01	20h03	Mon	Oct/18	17h07	05h01	Fri	Oct/29	02h11	12h11
Fri	Oct/08	07h35	21h15	Tue	Oct/19	18h05	05h28	Sat	Oct/30	02h49	13h13
Sat	Oct/09	08h13	22h27	Wed	Oct/20	19h03	05h54	Sun	Oct/31	03h23	14h17
Sun	Oct/10	08h57	23h40	Thu	Oct/21	20h01	06h21				
Mon	Oct/11	09h48	---	Fri	Oct/22	20h59	06h49				

METEOR SHOWERS

	Maximum Date/Time	*Observing Prospects*	*Duration*	*Radiant*	*ZHR**	*Velocity Km/sec*
Orionids	21st Oct 00h00 to 04h00	Poor at full Moon	2nd October – 7th November	10º north-east of **Betelgeuse**	30	68
Southern Taurids	5th Nov 21h30 to 03h30	New Moon	1st October – 25th November	15º west of **Aldebaran**	5	31

**A word of caution on predicted Zenithal Hourly Rate (ZHR)*:

A meteor shower's activity is gauged by its zenithal hourly rate. This value is often quoted in the press and astronomy publications and has sometimes been the source of misunderstanding and disappointment. ZHR is an ideal value; it is by definition the number of meteors a single observer could possibly see during a shower's peak with the radiant directly overhead on a clear, dark night. Most observers, however, will not see as many meteors as the ZHR suggests.

For more details regarding meteor watching, please see SGAS 2021, pages 86- 87.

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3. LOOKING OUT

SUGGESTED EVENING OBSERVATION WINDOWS

(Lunar observations notwithstanding)

Date	*Dusk end*		*Moon*
25th September to	19h46	***Rises***	23h09 (78%)
8th October	19h56	***Sets***	21h15 (7%)
25th October to	20h36	***Rises***	23h50 (76%)
6th November	20h51	***Sets***	21h20 (5%)

CLUB STARGAZING – Sadly, with the continuance of the pandemic, we still cannot enjoy physical club gatherings. Of course that should not stop our intrepid members digging out a good coat and indulging in stargazing from home or favourite darkest and *cloudless* spots.

And don't forget the fair **Selene**, our closest celestial neighbour.

Please consult our website for updates: http://www.hermanusastronomy.co.za

ANDROMEDA GALAXY
M31, NGC 224

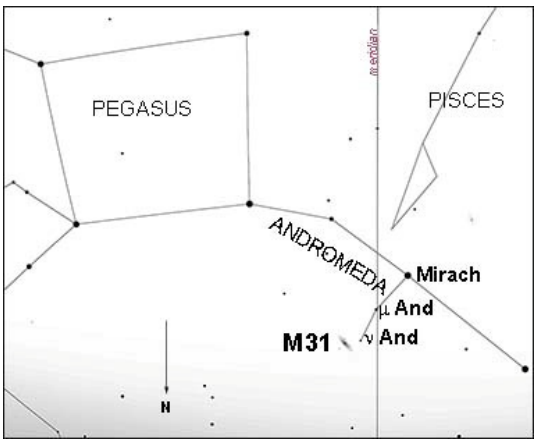
*The following details are applicable to **31st October 2021** at **23h00***

Description	Spiral galaxy	***Visibility on 31st October 2021***		
Constellation	Andromeda			
Distance	2 500 kly, 780 kpc	*Rises*	*Transits*	*Sets*
Magnitude	+3.4	19h10	22h45	02h25
Apparent size	178 x 70 arcmin			
Actual size	131.3 Kly, 40.2 Kpc	Naked Eye	A faint smudge on moonless nights	
Alt/Az	+14º08'01"/ 357º11'11"	Binoculars	Yes	
J2000 lat/long	+41º16'00" / 0º42'42"	Telescopes	Yes, with detail	

The magnificent Andromeda Galaxy is repeated.

Being so low on our horizon at this latitude, our observation windows are restricted to October and November of each year with further restriction by the moon's phases.

Please be aware that, although the charts on page 1 are timed for the middle of the first suggested deep sky observation window (2nd October), M31 will be too close to the horizon. I would recommend the second window, centred on 31st October, and wait until 23h00 for the galaxy to reach a higher elevation at 14º above the horizon. Another window will occur at the end of November and will be mentioned in the Skynotes.



The chart above is timed for 31st October 23h00

Discovery and History

The earliest known record of the Andromeda Galaxy was made in 964 CE by Persian astronomer **Abd al-Rahman al-Sufi**. He described it as "The Little Cloud" in his book of fixed stars. But it must have been known to Persian Astronomers at Isfahan as early as 905 AD. It also appeared on a Dutch star map in 1500.

The first telescopic description of M31 was given by **Simon Marius** in 1612 without claiming its discovery. Apparently unaware of al-Sufi's and Marius' observations, **Giovanni Batista Hodierna** independently rediscovered this object in 1654. **Edmond Halley**, in his 1716 treatise, credits the discovery of this 'nebula' to French astronomer **Ismail Bouillard**, who observed it in 1661.

In 1764, **Charles Messier** catalogued the object as number 31. Unaware of al-Sufi's earlier work, Messier incorrectly credited Marius with its discovery.

The "Great Andromeda Nebula" was long believed to be one of the nearest gaseous nebulae. In 1785, **William Herschel** wrote (incorrectly) that, based on its colour and magnitude, its distance "would not exceed 2000 times that of Sirius" – about 17 000 ly. **William Huggins**, the pioneer of spectroscopy, observed the spectrum of M31 in 1864. The "nebula" displayed a star-like continuous spectrum, unlike the line spectra of gaseous nebulae.

Description

The Andromeda Galaxy was formed roughly 10 billion years ago from the collision and subsequent merger of smaller protogalaxies.

With an apparent magnitude of +3.4, the Andromeda Galaxy is one the brightest Messier objects. It is visible to the naked eye from areas of moderate light pollution and can even be seen from urban areas with binoculars.

Although the apparent size of the galaxy is about 3 x 1 degrees – six times the size of the full moon – only the bright central region is visible to the naked eye. M31 harbours a dense and compact nucleus at

its centre, giving the visual impression of a star embedded in the more diffuse surrounding bulge.

Astrophotographers can gather fine, faint detail in the spiral arms. M31, classified as an "SA(s)b" spiral galaxy, has arms moderately wound up in a clockwise direction. Andromeda's galactic plane is oriented approximately 13º to our line of sight and is therefore seen nearly edge-on. Like the Milky Way, the Andromeda galaxy has satellite galaxies. Charles Messier found the two brightest, M32 and M110, both visible in binoculars and conspicuous in small telescopes.

The image to right shows M32 above the galaxy with M110 below.

Please keep in touch...

Have a look at our excellent website, edited by Derek Duckitt.

http://www.hermanusastronomy.co.za/

Contact ASSA

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