JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

May 2026

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Important Reminder:

To allow sufficient time to compile Janus and place it on the EAS Website by the 1st of the month any submissions for publication are required at least 3 days before the end of the month. Any items received after this date will be held over until the following month.

Editorial

Welcome to the May edition of Janus. This month's meeting on Friday 8 May features a talk by EAS member Casper Dyne on John Goodricke, the deaf astronomer.

There can be no doubt that the most significant event in the last month was NASA's keenly anticipated Artemis II mission sending 4 astronauts to orbit around the moon and return to earth in a similar fashion to Apollo 8 in December 1972. This was the first Moon mission since the last Apollo mission in1972 - over 50 years ago!

Elsewhere in this edition, Gary Walker has chronicled the mission in some detail - suffice to say, from its launch on 1 April until its splashdown in the Pacific Ocean on 11 April, the mission went precisely as planned. Apart from some niggling problems just prior to launch - all of which were dealt with efficiently – ironically, the only technical issue of note was the toilet was playing up! The success of the mission augers well for NASA's planned return of humans to the Moon within two years from now.

In this edition:

The next mission (Artemis III), currently planned for mid-2027, is a revised crewed demonstration mission in low Earth orbit (not on the lunar surface as was previously planned). It will focus on testing the docking and integrated operations of the Orion spacecraft with commercial lunar landers (SpaceX Starship HLS/Blue Origin). The mission will also test critical life support and EVA suits in preparation for a future landing in 2028. It will be followed by Artemis IV, scheduled for early 2028, which will deliver the first European Space Agency (ESA) astronaut module, I-Hab, to the Gateway lunar station, perform a crewed landing near the Moon's South Pole, and conduct roughly a week of scientific research.

Finally, helped by the recent spell of good weather, progress on the Society's observatory has continued to go well. The observatory building and shed are in place, and the trench for the cabling has been dug. Once the electrical work is complete, we will be able to install and commission the telescope and start to use the observatory. Some pictures showing recent progress appear on page 17.

John

skyUpdate
What's up this month?

The Solar System May

Only Venus and Jupiter are easy targets throughout this month. The remaining planets are either intermittently visible, or not visible at all

MERCURY: will soon pass behind the Sun. It begins the month difficult to observe, reaching its highest point in the sky during daytime and being 2° below the horizon at dawn. As the month progresses, it continues to be difficult to observe, reaching its highest point in the sky during daytime and being no higher than 7° above the horizon at dusk.

VENUS: will soon pass behind the Sun. It begins the month visible from around 20:45, 17° above the W horizon, as dusk fades to darkness. It will then sink towards the horizon, setting 2 hours and 33 minutes after the Sun at 22:55. By the end of the month, it will become visible at around 21:32, 17° above the W horizon, as dusk fades to darkness. It will then sink towards the horizon, setting 2 hours and 44 minutes after the Sun at 23:49

MARS: recently passed behind the Sun at solar conjunction. It begins the month not observable, reaching its highest point in the sky during daytime and being 3° below the horizon at dawn. It remains difficult to see throughout the month and, by the end of the month, will reach its highest point in the sky during daytime and be 0° below the horizon at dawn.

JUPITER: recently passed behind the Sun at solar conjunction. It begins the month visible from around 20:45, 44° above the W horizon, as dusk fades to darkness. It will then sink towards the horizon, setting at 01:52. By the end of the month, it will become visible at around 21:32, 21° above the W horizon, as dusk fades to darkness. It will then sink towards the horizon, setting 3 hours and 5 minutes after the Sun at 00:10.

SATURN: recently passed behind the Sun at solar conjunction. It begins the month difficult to see as it will reach its highest point in the sky during daytime and be 1° below the horizon at dawn. Visibility improves as the month progresses, but it remains difficult to see until, by the end of the month, still reaching its highest point in the sky during daytime it is no higher than 7° above the horizon at dawn.

URANUS: recently passed behind the Sun at solar conjunction. Throughout the entire month, it is not readily observable. It begins the month very close to the Sun, at a separation of only 19° from it and, by the end of the month is even closer to the Sun, at a separation of only 7° from it.

NEPTUNE: recently passed behind the Sun at solar conjunction. It begins the month not observable as it will reach its highest point in the sky during daytime and be 6° below the horizon at dawn. By the end of the month, emerging further from behind the Sun, it remains not observable, reaching its highest point in the sky during daytime and being no higher than 0° above the horizon at dawn.

Notable Events:

Some observations will require a telescope, whilst others will be visible with the naked eye. More information at: *https://in-the-sky.org*

May

1	Full Moon
2	Conjunction of Mercury and Eris
4	Lunar occultation of Antares The Moon at aphelion
5	The Moon at apogee
6	η-Aquariid meteor shower 2026 Lunar occultation of Sigma Sagittarii
8	η-Lyrid meteor shower 2026
9	Moon at Last Quarter
12	Messier 5 is well placed
13	Close approach of the Moon and Saturn Conjunction of the Moon and Saturn
14	Mercury at superior solar conjunction
15	Conjunction of the Moon and Mars The Moon at perihelion 1 Ceres at solar conjunction Venus at perihelion
16	New Moon
17	The Moon at perigee
18	Mercury at perihelion Lunar occultation of Beta Tauri
19	Conjunction of the Moon and Venus Close approach of the Moon and Venus
20	Conjunction of the Moon and Jupiter Close approach of the Moon and Jupiter
21	Close approach of the Moon and M44
22	Uranus at solar conjunction Venus at highest altitude in evening sky
23	Lunar occultation of Regulus Moon at First Quarter
28	Messier 4 is well placed
29	Asteroid 29 Amphitrite at opposition
31	Blue Moon Lunar occultation of Antares

June

1	The Moon at apogee
2	The Moon at aphelion The Great Globular Cluster in Hercules is well placed
3	Lunar occultation of Sigma Sagittarii Messier 12 is well placed
6	Messier 10 is well placed
7	Messier 62 is well placed
8	Moon at Last Quarter Mercury at highest altitude in evening sky
9	Conjunction of Venus and Jupiter Close approach of Venus and Jupiter Mercury at dichotomy
10	Close approach of the Moon and Saturn Conjunction of the Moon and Saturn Daytime Arietid meteor shower 2026
11	Messier 92 is well placed
12	Conjunction of the Moon and Mars
13	Close approach of the Moon and M45
14	The Moon at perihelion
15	The Moon at perigee New Moon Asteroid 14 Irene at opposition
16	Mercury at greatest elongation east Conjunction of the Moon and Mercury NGC 6388 is well placed
17	Conjunction of the Moon and Jupiter Close approach of the Moon and Jupiter Conjunction of the Moon and Venus Close approach of the Moon and Venus Lunar occultation of Venus The Butterfly cluster is well placed NGC 6397 is well placed
18	Close approach of the Moon and M44 The cluster IC 4665 is well placed
19	Lunar occultation of Regulus
20	Close approach of Venus and M44 The Ptolemy cluster is well placed
21	June solstice Moon at First Quarter
23	The Lagoon Nebula is well placed
24	NGC 6541 is well placed
25	Comet 78P/Gehrels passes perihelion
27	Lunar occultation of Antares June Bootid meteor shower 2026
28	The Moon at apogee
29	The cluster NGC 6633 is well placed
30	Full Moon The Moon at aphelion Lunar occultation of Sigma Sagittarii

Collected Observations (and thoughts) – Gary Walker

Venus – Posted 31 March

I observed Venus in the twilight of March 31st. It had not changed, substantially since I last observed it on 25 February. That is not really surprising, as it was still only 10.5' arcseconds in angular size, only a bit up from 10' arcseconds, last month. It was also at 94% phase, so it was gibbous, but in my telescope, it still appeared as a "Full" Venus! It is, however, now appearing in the early evening sky, so it is easy to see.

The Artemis 2 Story – A compilation of postings over the mission's duration

The excitement surrounding the launch of Artemis 2 began some months ago but gathered pace as the expected launch date got closer. This was to be the first Artemis mission with a crew on board. There would, however, be no landing on the Moon, only going around it in similar fashion to the Apollo 8 Mission.

By 31 March, with launch predicted for the following day, expectations were high. On 1 April, Artemis updates moved up the list of news items on both BBC and ITV news, reaching the top spot by 10pm – less than 90 minutes before the scheduled launch time of 11:24pm BST. Like the Apollo Missions, the launch was from Cape Canaveral.

I was watching it on the BBC News Channel where former British Astronauts Tim Peake and Helen Sharman were commentating from time to time.

There were some niggling problems, but all were dealt with efficiently. There was a countdown to the start of the "Launch Window". Finally, that was reached, but right to the last second, there was always a chance of a "Hold", or worse, a scrub. Certainly, I was expecting it to be a "Scrub"!

Soon after the start of the "Launch Window", the final Countdown started with just over 9 minutes remaining. Amazingly, this went like clockwork, and the Rocket launched at about 11.33pm. BST. It thundered up into the sky and reached Space in a few minutes. After about 7 minutes, live views of the spacecraft stopped and changed to an animation of the rocket. Later, Maggie Aderin-Pocock, of The Sky at Night, spoke for a little while.

This was the first Moon Mission since the last Apollo mission in1972 - over 50 years ago! As noted earlier, this Mission was similar to Apollo 8, which rounded the Moon at Christmas 1968, when I was in my final year of Infants School!

On that occasion, the Astronauts were Frank Borman, Jim Lovell, and William Anders. It was on that flight that the iconic images of the Earth rising from behind the Moon, were taken.

If only, Sir Patrick Moore was still around now, what would his thoughts have been?

The mission, of course, was much reported on social media. Unfortunately, and depressingly, there were loads of Moon Landing Deniers, Flat Earthers, and Bible Bashers, along with Trolls, who just rubbish every Mission. Their tiresome utterings only serve to insult all the great scientific achievements that occurred. Some of them claimed that rockets would never get through the "Firmament " (whatever THAT is).

I can't tell how many of these people are idiots, how many are Conspiracy Theorists, who are ignorant of true science, and how many are Trolls who just love winding people up. Unfortunately, they all infest most Space sites. Whoever or whatever they are, they just ruin and insult the achievements of science.

This is the trouble with social media - everyone is an "armchair expert", and a "keyboard warrior"! And, of course, social media goes on 24/7, unlike in the Apollo days, when the news had to wait for the newspapers to be printed, and the TV news reports to come out. Even better, in those days, social media didn't exist!

By about 12.55am – some 2 hours after launch - live images from Artemis had returned. One could see the Earth, and it was immediately clear that they were already much higher up than normal, as the Earth was clearly smaller and further away than normal.

The NASA Press Conference began about 1.13am. It didn't last very long. The entire live broadcast of the launch, ended about 1.48am, which was over 2 hours after the launch.

In the 24 hours after launch, Artemis 2 orbited the Earth, whilst the astronauts tested the systems, to check that everything was working OK. I remember this also happening after each Apollo launch, with the spacecraft orbiting the Earth, before deciding it was correct to start the Trans Lunar Injection, to start making their way to the Moon. At this point they would start the classic "Figure of 8" path to the Moon, and eventually back to the Earth.

The newspapers on 2 April didn't cover the launch, as it occurred too late to get into them. When they did report, the media made much of the astronauts going much further away from the Earth than ever before, and seeing the far side of the Moon, which they claimed people had never seen before. In reality, of course, Apollo astronauts before them saw the far side of the Moon. It is, however, certainly true that this Mission went much further from the Earth than usual, being as missions in the last few decades have only reached Earth orbit, in the Space Shuttles, or to the International Space Station. I actually feel it's quite bizarre to be seeing a Mission to the Moon, again!

During the broadcast on Artemis after Midnight on 3 April, Dr Maggie Aderin-Pocock, from the Sky at Night, and Tim Peake, were speaking again. (Maggie's main subject is the Moon, anyway!).

It was announced that Artemis had now started its journey to the Moon. It had started its "Trans Lunar Injection" procedure, just over 24 hours after the launch. This burn began at 11.49pm BST. The journey would take about 4 days (the same was true, for the Apollo Missions). This meant that they were now committed to the Moon, with the headline on the BBC News Channel now reading "Astronauts begin push towards the Moon".

With Artemis now speeding at 25,000 mph, having achieved escape velocity from the Earth, there were beautiful views of a crescent Earth! This is a really unusual sight for us to see. People have not been to the Moon since Apollo 17 in December 1972, over 53 years ago. At the time of the Apollo Missions, I was just finishing at my Infants school and was in the 4th year of my Junior School!

In the early hours of 4 April, there was very little about the Artemis Mission – presumably because it was now only coasting along, with no imminent major milestones. However, at the latest NASA Conference, it was announced that Artemis was now about 100,000 miles out from the Earth, with another 150,000 miles to go to the Moon - nearly half- way there.

They were now far enough away from the Earth, that they could see it as a full planet, rather than the huge expanse we generally see!

By 5 April, Artemis was over 200,000 miles from Earth. All was going well except that, of all things, the toilet was playing up!

By now, the crew could see part of the far side of the Moon and, as one of them remarked, it made the Moon look entirely strange and unusual. Of course, they would be seeing it from a different perspective than we see from Earth!

Sadly, however, the conspiracy nuts were out in force on the social media sites, claiming that it was all fake. They keep saying the same things and asking the same old questions :

- This is AI.
- Why can't I see the American Flag? (they presumably mean the one at the Apollo 11 site!)
- Where are the Stars in the picture?
- Astronauts seen leaving the rocket in escape pods, before the launch!
- Why does the Moon (or Earth) appear so small?

The night of 6/7 April saw the crew observe the anticipated Total Solar Eclipse which finished around 2.27am BST UK time. They reported observing Saturn and Mars (two planets long since lost from our skies, into the glare of the Sun).

The astronauts also reported seeing flashes on the dark side of the Moon, due to meteor impacts. Occasionally, these have also been seen from earth, proving that the Moon is still under constant meteor impacts!

On 7 April, for once, Artemis was THE TOP STORY on the 1pm News! The report was all about its passage behind the Moon and starting to return to earth. The Solar Eclipse was also featured. Of course, this wasn't visible from the Earth and, in any case, Solar Eclipses can only be seen at a New Moon - last night, from Earth, the Moon was gibbous!

The astronaut's view of the Total Solar Eclipse was similar to that seen in the marvellous film, "Forbidden Planet", where the ship goes behind a planet, thus hiding the star of Altair, and creating a Total Eclipse, as seen from the ship! One character in the film remarks "Meanwhile, this ship arranges its own eclipses"!

Just like Apollo 8, they also captured an Earth Rise, from behind the Moon. This time, it appeared as a crescent Earth, rather than the gibbous one from Apollo 8. Crescent Earths appear very strange, as we can never see them like that, from our perspective!

Unlike the side of the Moon seen from Earth, the far side of the Moon has very few Mares. One feature that the astronauts imaged was Mare Orientale, a large impact structure. It is a far side feature but, at a favourable Libration, the edge of this feature can actually be seen from Earth, albeit very foreshortened. I have seen this.

On the Artemis images, Mare Orientale can be seen not far from the dark crater, Grimoldby (which is visible from Earth).

Unlike the previous night, 7 April itself was a quiet day for the Mission. They were now on their way back to Earth.

We had our monthly EAS meeting on 10 April. It is highly unusual to have a meeting, during which a Moon Mission is going on - the last time that this happened must have been well over 50 years ago! Tonight, the Artemis crew were preparing for Re-entry and Splashdown at around 1am BST the following morning. It struck me as funny how all the major milestones of this Mission have been at around this same time!

Re-entry is always the most dangerous part of the Mission. There had been scepticism about the heat shield, which is the most essential safety item at this point in the mission! There is always a terrifying electromagnetic blackout during re-entry, lasting for 6 minutes, when plasma forms around the capsule and communication with the Earth is impossible, so we don't know if they are safe, until they are through this, and the parachutes deploy safely, too! During the re-entry of Apollo 13, there was particular concern, as no one knew if the heat shield had been damaged by the explosion, so, naturally, there was tremendous relief when the deployed parachutes could be seen coming through the clouds!

Dr Helen Sharman (the first British Astronaut) and Tim Peake were again on the "show", along with other astronauts.

The return capsule, Integrity, carrying the crew, separated from the Orion Service Module at about 12.30am BST. From about 12.49am, there were live views of the Earth, but by 12.56am, the communications blackout had started and the pictures disappeared. At 1.01am, contact was thankfully regained with the crew. Even better, the parachutes all opened on schedule, and the splashdown occurred at 1.07am. They were only 3000 yards from the Mother Ship, and conditions were perfect with a calm sea.

Recovery of the astronauts, as usual, took a long time, as boats were continuously circling the capsule, checking that everything was OK. Later the flotation collar and "front porch" were set up and inflated.

The recovery crew started "extracting" the astronauts from about 2.31am, placing them on the "front porch", which was later detached from the capsule and became a raft. Helicopters started lifting the astronauts off, in harnesses, from about 2.49am, and they were then flown to the ship where they were escorted from the helicopters across the flight deck to Medical Bay!

So, WHAT a successful Mission it was, and 10 exciting days!

After the Splashdown, the latest Conspiracy Theorists question was “why wasn't there steam, when the capsule landed in the sea?” They assume that the capsule would still be red-hot – in fact, it would have mostly cooled from the descent, once the main Re-entry was over. So many people have a complete lack of scientific knowledge – perhaps they fear things that they can't understand, so find it a lot easier to believe that it is all a conspiracy. Maybe it makes them feel superior and think they are one up on us. Whatever the reason, they have been around since Apollo but, of course, back then, we were spared the curse of social media. On social media, everyone is an "expert".

Owen Brazell – Posted 18 April

Sadly, Owen Brazell died in a motor accident on his way to the Kelling Heath star party on 16 March, this year. He was one of the leading Deep Sky visual observers in Britain.

He gave a lecture (on Zoom) to our Society in April 2021, which was of course, in the Pandemic lockdown period. He last gave a lecture to the Society in September 2022, on Planetary Nebulae. He was a member of the Webb Society, and, for the past 20 years, also wrote an article each month in "Astronomy Now" magazine called "Deep Sky Challenge". Indeed, an article by him still appeared in the latest issue, for May.

Sadly, his Deep Sky Challenge objects were a little too faint for my telescope!

Lyrid Meteor Shower – Posted 23 April

The media has been out in force again, this time promoting the Lyrid Meteor shower, which peaks on 22 April. It featured in the Weather section of the BBC News, and was even on the radio!

There has been the usual propaganda of "lighting up the sky" although, with an hourly rate of only about 18 meteors, it is not that wonderful. Admittedly, the BBC did say as much, but also said "up to 100 meteors per hour possible"!

Incidentally, this shower is the oldest, still existing, meteor shower, which was first recorded in 687BC!

Venus – Posted 27 April

On 25 April, I could see that Venus is now at gibbous phase. It is of 11.4' arcseconds in angular size and of 89% phase. Of course, this means that it still appears rather small in telescopes.

For the last few weeks, it has been very prominent in the early evening sky, with Jupiter much higher up.

Partial Solar Eclipse of 29 April 1976 – Posted 29 April

Exactly 50 years ago today, on 29 April 1976, I saw a partial Solar Eclipse. This was the first one that I was able to see since 25 February 1971, due to the following 3 eclipses being clouded out.

Unfortunately, I had to go to school that day (I wish now, that I had taken a "sickie"). It was near the end of my second year at my secondary school at Nork Park, Banstead. If I had had stayed at home, I could have observed it through my telescope, but I had to make do with the naked eye (with a filter).

Ironically, the only 2 eclipses of this period that I was able to observe occured when I had to be at school! The other 3 eclipses occurred out of school hours, but it was cloudy on all of those occasions - a typical example of. "Murphy's Law"!

I saw the eclipse from about 10.20am to at least mid-day. Fortunately, the eclipse was at its best at our first break from 11am!

I had brought along a piece of welder's glass with which to observe it. I showed it to my friends, too. However, one boy thought that I was tricking him in some way and didn't believe that there was an eclipse!

I could see that the Sun was about one third eclipsed, and I noted that the sky did not go darker (unlike the February 1971 eclipse).

The eclipse was about 29% from London, but visible as an Annular eclipse from Santorini, where Sir Patrick Moore was observing it.

This eclipse was the last in a prolific period of 5 solar eclipses visible from the UK, which had lasted from 25 February 1971 until 29 April 1976.

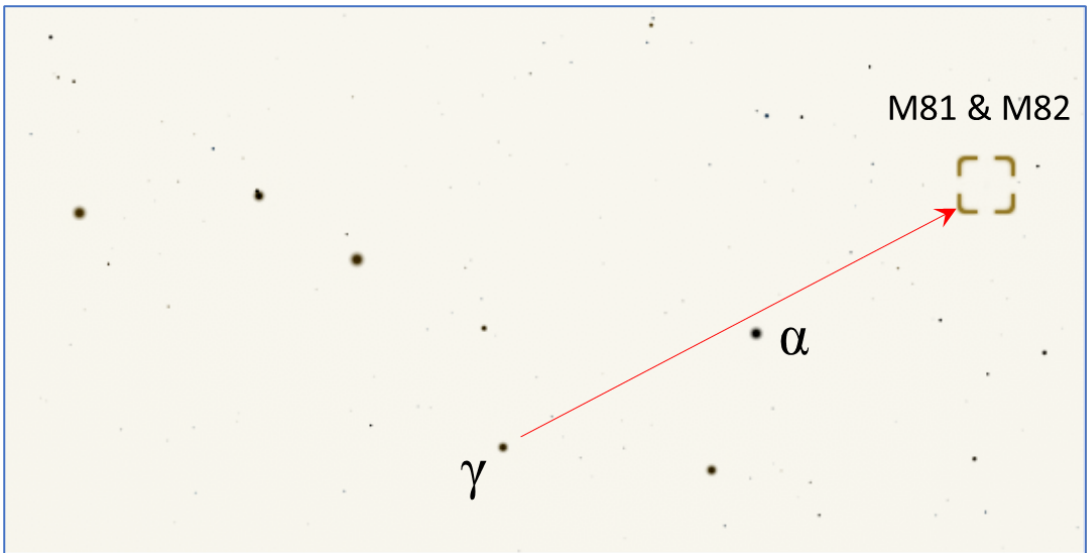
After this eclipse, there were no more solar eclipses visible from the UK until 1982 - a wait of 6 years - and even they were clouded out! I had to wait until 1983 and 1984, to actually be able to observe any more eclipses!

Object of the Month: M81 & M82 – Martin Howe

With the spring equinox now behind us, and the summer solstice rapidly approaching, the hours of true darkness are diminishing rapidly. The only real upside is that the evenings are not as cold! On another positive note, with late spring and early summer comes the "season of the galaxies". The Earth is in a position in its orbit such that our view is more away from the centre of our galaxy and into the universe beyond, revealing many galaxies that are within relatively easy reach for both visual and imaging opportunities. Although a number of these may be visible in binoculars or small telescopes, they will appear to the eye as little more than a small misty patch of light. However, with even some relatively basic imaging equipment, many of these can be captured with varying degrees of detail.

This month we see the constellations of Coma Berenices and Virgo rising in the east, which are home to many galaxies, with more opportunities in Leo, now rising high in the south.

However, this month I am looking at the galaxy pairing of M81 and M82 in Ursa Major. Although Ursa Major is circumpolar (i.e., never sets) as seen from London, at this time of year it is almost overhead, away from the murk of the horizon. For me personally as well, from my garden, Ursa Major is not strictly circumpolar as it is not visible behind my house in early winter!



M81 and M82 are easy to locate by drawing a line from γ Ursae Majoris (Phecda) and extending it through α Ursae Majoris (Dubhe) by a similar length

M81, otherwise known as Bode's Galaxy, is a classic example of a "grand design" spiral galaxy, similar in structure to our own Milky Way. It features a bright central bulge surrounded by well-defined spiral arms. Shining at about magnitude 7 and spanning a size of about 27 x 14 arcminutes it should be readily visible in binoculars (for reference, the full Moon is about 30 arcminutes in diameter).

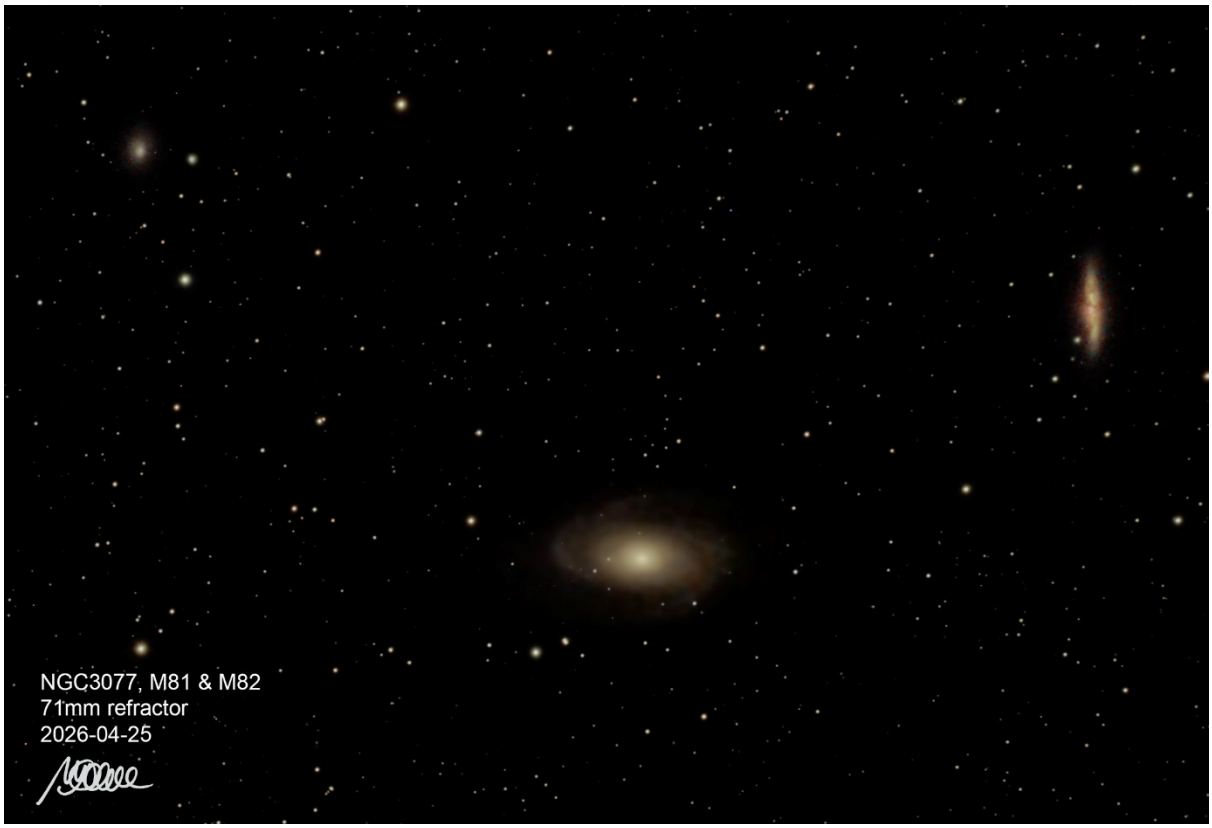
M82, also known as the "cigar galaxy", has quite a different appearance. It is known as a "starburst galaxy," as it is undergoing an intense period of star formation. Instead of neat spiral arms, M82 looks irregular and disturbed, with thick clouds of gas and dust. Powerful

stellar winds and explosions from young, massive stars are pushing huge streams of material out of the galaxy, creating a dramatic, almost explosive appearance. M82 is smaller and fainter than its neighbour, shining at about magnitude 8.4 and just 11 x 4 arcminutes in size.

Both these galaxies are about 12 light years away from us – relatively close in the grand scheme of things, and they are also relatively close to each other – a matter of a few hundred thousand light years. As a result, they are gravitationally interacting and M81's gravitational pull has disrupted M82's structure. This disturbance compressed gas within M82, triggering the rapid birth of new stars although, interestingly, M81 itself was less impacted by this interaction.

These two galaxies appear a little over half of a degree apart in the sky – little more than the width of the full Moon. Consequently, they can be imaged as a pair very easily. The cropped image below was taken with a 71mm refractor and ASI294MC colour camera, fitted with an L-Pro light pollution filter. It comprised of a stack of 26 2-minute exposures.

Also in the image, towards the top left, is a much smaller elliptical galaxy, NGC 3077, shining at magnitude 10. This is still actually part of the M81 group and was discovered by William Herschel in 1801.



Galactic Bad Hair Day

NGC4395 is a dim, chaotic galaxy with disorganised spiral arms and a central barred structure… a fun target for the clear nights in early April. NGC4395 is about 8 million light years away in the direction of the constellation Canes Venatici, and it is a Seyfert galaxy. In fact, it is the dimmest, and closest, of the Seyfert Galaxies….

Figure 1: NGC4395 in Canes Venatici. Captured early April 26, Celestron 9.25SCT, f10, LPro filter, stacked high graded 480x120second images.

But what is a Seyfert galaxy and what makes them special?

"Normal" galaxies have spectra (their 'rainbow' of light, from red to ultraviolet and beyond) that are typical of their constituent stars, plus gas and dust emissions. Figure 2 shows our sun's spectrum, a broad spectrum with notches caused by absorption in the sun's outer atmosphere. A galaxy composed of millions of 'suns' would have a composite spectrum like this, with minor additional features caused by ionised gas-cloud emission lines (eg. Ha, or Oiii) and absorption by dust.

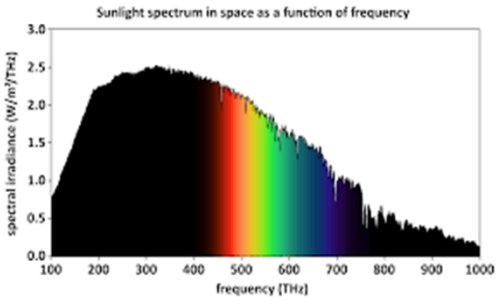


Figure 2: Our sun's spectrum. From https://www.wtamu.edu/~cbaird/sq/2013/07/03/what-is-the-color-of-the-sun/

Astronomers Edward Fath and Vesto Slipher, working at the Lick Observatory in California in 1908 noticed that galaxy Messier 77 (NGC1068) showed an atypical spectrum, characterised by strong emission lines, rather than absorption lines. Edwin Hubble studied NGC1068 in 1926 and in 1943 Carl Seyfert, following observations made at the Mount Wilson observatory, published a key paper describing six galaxies with similar emission line spectral characteristics… these became known as Seyfert galaxies. **Error! Reference source not found.** s hows generic examples – note the strong hydrogen peak at 6550 Å and Oiii at 5007 Å.

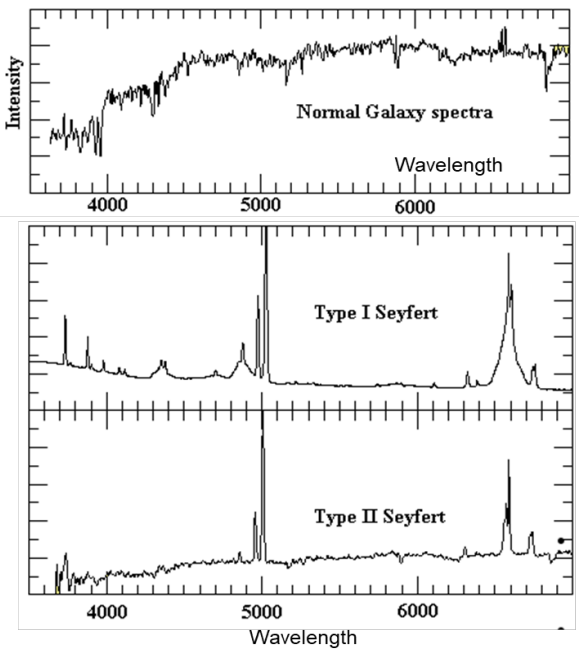


*Figure 3: Typical galaxy spectra (top) and example spectra of Seyfert galaxies, showing the strong emission peaks. Wavelength increases to the right, in contrast to **Error! R eference source not found.**, which shows frequency*

Further work revealed that the emission spectra commonly showed significant broadening, and in 1974 astronomers Khachikian (Armenian astronomer working in Byurakan) and Weedman (at this time a professor at Vanderbilt Uni, Nashville) subdivided Seyfert galaxies as Type 1 (with broad emission lines) and Type 2 (with narrow emission lines).

A spectrum taken precisely from the bright, concentrated core of a Seyfert galaxy is dominated by broad emission peaks with minimal background – an example shown in **Error! Reference s ource not found.** … the peak is several hundred Å wide, whereas a normal H peak from an ionised gas cloud (e.g. Orion nebula M42) is 5-7 Å wide (which may ring a bell for astrophotographers using narrow band filters).

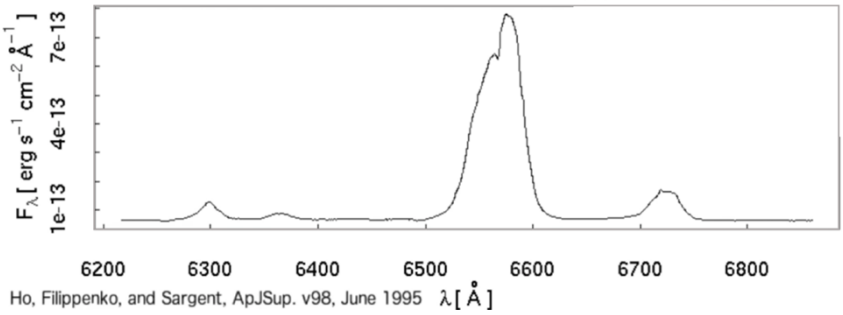
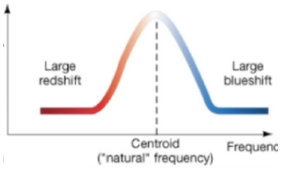


Figure 4: Broadened hydrogen emission peak at the centre of NGC1068

Broad emission lines are caused by 'doppler broadening'… some atoms are moving fast toward us, and others are moving away from us very fast. This occurs if the ionised gas is spiralling a very high speeds around a central point. The width of the H peak in **Error! Reference s ource not found.** implies very high orbital velocities, of up to 5000km/s.



The spiralling gas, of dominantly hydrogen, helium, nitrogen and oxygen, is heated to incredible temperatures and emits strongly in visible and UV wavelengths…. often the nucleus region may be as bright as all the stars in the galaxy put together, equivalent to between 10^8 to 10^{11} solar luminosities. Moreover, the nuclei often show random variations in

brightness on an extraordinarily short timescale of a few days, implying that whatever is causing the variation is small – only a few light-hours or days in size.

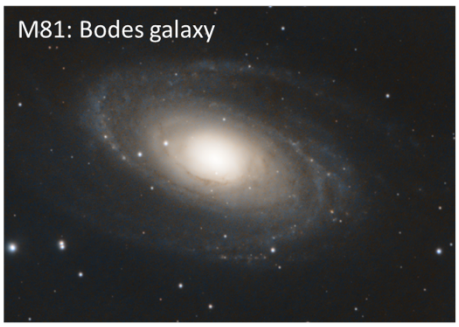
The observations of high orbital velocities, intense heating, small radial size and short timescale variability lead to the conclusion that the material is orbiting and accreting into a supermassive black hole at the centre of the galaxy.

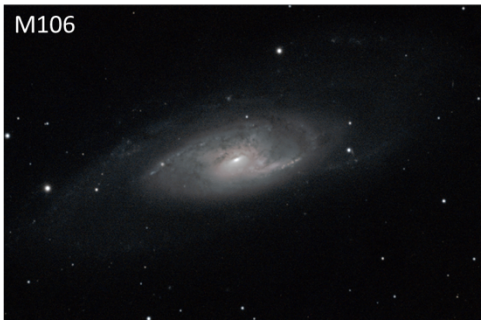
Seyfert galaxies are now known to be a subclass of a broad class of Active Galactic Nuclei (AGN) galaxies that are powered by accretion onto supermassive black holes at the centre. The AGN family includes quasars, blazars, radio galaxies, and Seyferts.

Seyferts are less luminous that other members of the family, especially quasars, and are usually spiral galaxies, though the example above, NGC4395, is bit of an anomaly with a rather chaotic barred spiral structure and no central bulge, possibly because its supermassive black hole has devoured most of the stars in the central area.

The early classification of type I and type II Seyferts is now believed to be due to viewing angle rather than an inherent difference in the galaxy – type II do not show the broad emission lines from the nucleus because we are viewing the galaxy edge on, and the nucleus emission is obscured by gas and dust in the galactic plane. The thin emission lines of a type II are produced by ionised gas clouds in the outer arms of the galaxy.

Familiar galaxies that are Seyferts include M51 (Whirlpool galaxy), M77, M81 (Bodes' galaxy) and M106.





The unseen challenges of life on the Moon

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For the first time since the Apollo era, humans are preparing not just to visit the Moon, but to live and work there for weeks, months – and eventually years.

But what would it really be like to spend an extended period on the lunar surface? The answer is exhilarating – and brutally unforgiving. An exciting new era of deep-space exploration is opening up. The US Artemis programme aims to set up an outpost on the Moon's surface. It marks a fundamental shift in how we explore space.

Rather than just leaving "flags and footprints" as the Apollo missions did, Nasa wants to establish a sustained human presence on the Moon, beginning at the lunar South Pole.

The programme unfolds in stages. In 2022, the Artemis I mission successfully tested the Space Launch System (SLS) rocket and Orion spacecraft as an integrated system on an uncrewed mission around the Moon.

On April 1, 2026, NASA launched Artemis II a ten-day mission, carrying four astronauts around the Moon.

As NASA's first crewed flight of Orion and SLS, Artemis II is a pivotal mission designed to verify that life-support systems, navigation, thermal protection and deep-space operations all function safely with humans onboard.

Before astronauts can live on the Moon, the journey there must be proven reliable.

Beyond these early missions, NASA's long-term vision extends far beyond a single landing. NASA plans to spend US$20 billion (£15 billion) on a lunar surface base, intended to support repeated and progressively longer surface stays. This is designed to teach us how to operate sustainably beyond Earth – knowledge that will ultimately feed forward to future human missions to Mars, the horizon goal.

Health challenges

Living on the Moon will challenge every organ system in the human body. The lunar environment exposes astronauts to a unique space exposome – the combined set of physical, chemical, biological and psychological stressors encountered beyond Earth.

These include reduced gravity (about one-sixth of Earth's), chronic exposure to cosmic radiation, extreme temperature swings, toxic lunar dust, isolation, disrupted sleep-wake cycles, and prolonged confinement.

Unlike astronauts in low-Earth orbit, lunar crews operate largely outside Earth's protective magnetic field. This increases exposure to space radiation, which can damage DNA, disrupt immune function and affect the brain and cardiovascular system in subtle but potentially serious ways.

Reduced gravity also fundamentally alters how blood, oxygen and fluids move around the body. Microgravity can disrupt how blood, oxygen and glucose are delivered to the brain, potentially increasing vulnerability to neurological and vascular dysfunction over time.

To properly understand these risks, we need to look beyond individual organs and instead consider the space integrome – the way that the brain, heart, blood vessels, muscles, bones, immune system and metabolism interact as an integrated whole under space conditions. A small disturbance in one system sends ripples through others.

One of the most challenging aspects is that many space-related physiological changes develop insidiously. Astronauts may feel well while complications simmer beneath the surface, only becoming apparent months or even years later.

That is why Nasa places such emphasis on long-term physiological monitoring and human risk mitigation in its Artemis science strategy

Reducing the risk

The encouraging news is that humans are remarkably adaptable. The challenge is guiding that adaptation in safe and sustainable ways. Space countermeasures are the tools used to reduce risk and preserve astronaut health.

Exercise remains the cornerstone. On the International Space Station, astronauts spend around two hours per day exercising to protect muscle mass, bone density and cardiovascular function. On the Moon, however, exercise systems must be redesigned for partial gravity, where familiar Earth-based loading no longer applies.

Nutrition is another powerful countermeasure. Diet influences bone health, muscle maintenance, immune resilience and even how the body responds to radiation.

Personalised nutrition strategies, tailored to individual physiology rather than a "one-size-fits-all" menu, are likely to become increasingly important during long lunar missions.

Artificial gravity is also being explored. Short-radius centrifuges could expose astronauts to brief periods of increased gravitational loading, potentially helping stabilise cardiovascular and neurovascular systems. While still experimental, this approach may prove valuable for future surface missions.

Radiation protection will rely on multiple layers of defence: habitat shielding – potentially using structures made of lunar soil – early warning systems for solar storms, and operational strategies that limit exposure during high-risk periods.

Crucially, countermeasures should be proactive rather than reactive. Continuous physiological monitoring, wearable sensors and advanced data analytics may allow mission

teams to detect early warning signs and intervene before small problems become mission-limiting ones.

Spending extended time on the Moon will be awe-inspiring. Imagine watching Earth hang motionless above a stark, silent horizon, or working under a sky that never turns blue.

But it will also be demanding, uncomfortable and unforgiving. The Moon is not just a destination – it is a test of our biology.

If we can learn how to keep humans healthy, resilient and productive on the lunar surface, we take a decisive step toward becoming a truly spacefaring species. Artemis shows that exploration is no longer about brief heroics.

It is about sustainability, adaptability and understanding ourselves as deeply as the worlds we seek to explore.

In learning how to live on the Moon, we may ultimately learn as much about life on Earth as we do about our future beyond it.

More information about NASA's plans for a permanent base on the Moon can be found here: https://theconversation.com/nasa-plans-to-have-a-permanent-base-on-the-moon-by-2030-how-it-can-be-done-277752

Up Next:

NEXT MEETING: 8pm Friday 8 May – Nonsuch High School

EAS member Casper Dyne will give a talk about John Goodricke the deaf astronomer.

As usual, there will also be a presentation on the sky at night for the coming month.

NEXT USER GROUP:

Suspended until further notice.

NEXT OBSERVING SESSIONS

The next sessions, allowing for moon rise & set times and cloud conditions, should be sometime around the new moon which is on 16 May.

The precise date and timings of any session will be advised by email and WhatsApp a few days in advance but should be within the period 16 – 19 May.

AD HOC OBSERVING AT WARREN FARM:

These will be at short notice when the weather is favourable, and may replace, or be additional to, sessions at Denbies. Please watch our WhatsApp feed for alert

Observatory Construction Continues


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