JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

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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 March edition of Janus. This month's talk, which promises to be another interesting one, will be given by Prof. Sarah Matthews from UCL and is entitled "Up Close and personal: the Sun, our local star".

February was a month in which the most talked about item was the potential opportunity to view up to 7 planets on a single day, albeit not all would be visible at the same time! To maximise this opportunity, Steve organized a group viewing at Warren Farm on the evening of 28 February, which proved to be a great success, attracting over 15 people, many of them children. Let's hope for further such sessions during the year.

Turning our thoughts to events in March, with 3 US missions now on their way to the Moon, it promises to be an exciting month for the future of lunar exploration and exploitation.

In February 2024, Intuitive Machines' IM-1 "Odysseus" mission became the first US mission to make a soft landing on the Moon since Apollo 17, and the first private craft to do so. IM-1 was selected through NASA's Commercial Lunar Payload Services (CLPS) initiative, in which NASA contracts with a commercial partner, in this case Intuitive Machines, in such a way that the partner provides the launch and payload. The launch on a SpaceX Falcon 9 was successful and, after a few hiccups during landing, the lander carried out measurements with an optical and radio telescope before ending its mission seven days later.

In a continued attempt to share costs between the public and private sectors, a second CLPS mission, "Blue Ghost Mission-1", was launched on a SpaceX Falcon 9 on 15 January 2025 and entered lunar orbit on 13 February. The mission carries a lander from Firefly Aerospace, and is scheduled to land in Mare Crisium, near Mons Latreille, on 2 March. Designed to deliver ten payloads to the lunar surface, the objectives of the mission are to investigate heat flow from the lunar interior, plume-surface interactions, crustal electric and magnetic fields. X-ray images of the Earth's magnetosphere will also be taken. Technology tests to be undertaken include [1]regolith

[1] Regolith: The layer of unconsolidated solid material covering the bedrock of a planet

sampling, regolith adherence, Global Navigation Satellite System abilities, radiation tolerant computing, and dust mitigation using electrodynamic fields.

Hot on the heels of the Blue Ghost mission, on 26 February, a further SpaceX Falcon 9 launch carried a third CLPS mission, the second from Intuitive Machines, and yet another lander, “Athena”. Designed to test extraction methods for water and volatile gases, the intention is to land Athena in the Mons Mouton region, about 160 km from the lunar south pole, on 6 March.

Athena also carries a hopper, “Grace”, that can travel up to 25 km on the lunar surface. Home to about 10 kg of payloads, the rocket-propelled drone will aim to take images of the lunar surface and explore nearby craters. There are also two rovers on-board: MAPP, built by Lunar Outpost, will autonomously navigate the lunar surface while a small lightweight rover, Yaoki, built by the Japanese firm Dymon, will explore the Moon within 50m of the lander.

Importantly, Athena is part of NASA’s quest to build the infrastructure on the Moon that would be required for long-term lunar exploration. If the landing is successful, it will help test the first cellular communications network on the Moon; Nokia's Bell Labs' Lunar Surface Communication System (LSCS) is a 4G "network in a box" designed to operate around the lunar South Pole in a similar fashion to terrestrial mobile phone networks. Grace and MAPP will use the LSCS to communicate with Athena on the Moon, even when Grace descends into the permanently shadowed craters of the Moon. Nokia and Intuitive Machines hope to transmit photos and video, potentially including the first image of ice on the Moon, back to Athena through the lunar cellular network. The long-term objective is to ensure that when NASA's Artemis astronauts land on the Moon in the next few years, their spacesuits will use similar Nokia cellular technology.

Launched aboard the same rocket as Athena was NASA’s “Lunar Trailblazer” – a lunar orbiter that will investigate water on the Moon and its geology. Relying on a low energy transfer from its initial deployment orbit, the spacecraft will take at least 4 months to achieve lunar orbit. Once there, it will spend two years orbiting the Moon from a 100 km altitude polar orbit. Weighing 200 kg and about the size of a washing machine, it will map the distribution of water on the Moon’s surface using an imaging spectrometer built by NASA’s JPL and a thermal mapper developed by the University of Oxford. The mission was selected in 2019 as part of NASA’s Small Innovative Missions for Planetary Exploration programme.

For those who may be interested to see how many lunar missions there have been since 2020, I have included a table towards the end of this edition – there have been 14 including the most recent three, but there were none in 2021 – post Covid effect?

Finally, don’t forget that British Summer Time begins at 2 a.m. on Sunday 30 March when the clocks go forward one hour!

John

skyUpdate
What's up this month?

The Solar System March

MERCURY: begins the month having recently passed behind the Sun at superior solar conjunction. Becoming visible at around 18:01 GMT, 8° above the W horizon, as dusk fades to darkness, it will then sink towards the horizon, setting 1 hour and 23 minutes after the Sun at 19:03. By the end of the month, having recently passed in front of the Sun at inferior solar conjunction, it is not observable, reaching its highest point in the sky during daytime and being 8° below the horizon at dawn.

VENUS: begins the month soon passing in front of the Sun at inferior solar conjunction. It will become visible at around 18:01 GMT, 24° above the W horizon, before sinking towards the horizon, setting 3 hours and 6 minutes after the Sun at 20:46. By the end of the month, having now passed in front of the Sun at inferior solar conjunction, it is not observable reaching its highest point in the sky during daytime and being no higher than 6° above the horizon at dawn.

MARS: recently passed opposition, and begins the month visible in the evening sky, becoming accessible around 18:10 GMT, 52° above the SE horizon. Reaching its highest point in the sky at 20:36, 64° above the S horizon, it will continue to be observable until around 03:49, when it sinks below 9° above the NW horizon. By the end of the month, still an early evening object, it will become visible at around 20:11, 62° above the S horizon, as dusk fades to darkness. It will then sink towards the horizon, setting at 04:25.

JUPITER: is currently an early evening object, and begins the month visible in the evening sky, from around 18:01 GMT, 60° above the S horizon, as dusk fades to darkness. Reaching its highest point in the sky at 18:03, 60° above the S horizon, it will continue to be observable until around 01:03, when it sinks below 7° above the NW horizon. By the end of the month, still an early evening object, but now receding into evening twilight, it will become visible at around 19:52, 48° above the SW horizon, before sinking towards the horizon and setting at 01:28.

SATURN: will soon pass behind the Sun at solar conjunction. It begins the month extremely difficult to observe as it will reach its highest point in the sky during daytime and be 1° below the horizon at dusk. Continuing to be extremely difficult to see, by the end of the month it will not be visible as it will reach its highest point in the sky during daytime and be 6° below the horizon at dawn.

URANUS: begins the month as an early evening object, now receding into evening twilight, and will become visible at around 18:59 GMT, 47° above the SW horizon, before sinking towards the horizon, setting at 00:28. By the end of the month, soon passing behind the Sun at solar conjunction, it will become visible at around 20:53 (GMT), 23° above the W horizon, as dusk fades to darkness. It will then sink towards the horizon, setting at 23:36.

NEPTUNE: begins the month soon passing behind the Sun at solar conjunction. Extremely difficult to see, it will reach its highest point in the sky during daytime and be no higher than 1° above the horizon at dusk. By the end of the month, having recently passed behind the Sun at solar conjunction, it is not observable, reaching its highest point in the sky during daytime and being 12° below the horizon at dawn.

Notable Events:

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

March

1 Close approach of the Moon and Mercury
Lunar occultation of Mercury
The Moon at perigee
Conjunction of the Moon and Venus

3 Conjunction of Mercury and Neptune
The Theta Carinae cluster is well placed

4 Mercury at perihelion

5 Close approach of the Moon and M45

6 Close approach of the Moon and Jupiter
Moon at First Quarter

7 Lunar occultation of Beta Tauri
Mercury at dichotomy

8 Mercury at highest altitude in evening sky
Mercury at greatest elongation east
The Wishing Well cluster is well placed

9 Close approach of the Moon and Mars
Conjunction of Venus and Mercury

12 Saturn at solar conjunction
Asteroid 8 Flora at opposition

14 Full Moon
Total lunar eclipse
γ-Normid meteor shower 2025

16 Lunar occultation of Spica

17 The Moon at aphelion
The Moon at apogee

19 Neptune at solar conjunction

20 March equinox
Lunar occultation of Antares

22 Moon at Last Quarter

23 Venus at inferior solar conjunction
Saturn ring plane crossing

24 Mercury at inferior solar conjunction

25 Comet 21P/Giacobini-Zinner passes perihelion
1 Ceres at aphelion

27 The Moon at perihelion

28 Conjunction of the Moon and Saturn

29 Partial solar eclipse
New Moon

30 The Moon at perigee

31 136472 Makemake at opposition

April

1 The Moon at apogee

2 The Moon at perihelion
Close approach of the Moon and Venus
Conjunction of Mercury and Neptune

3 Conjunction of the Moon and Mercury
The Sombrero Galaxy is well placed

5 Asteroid 7 Iris at opposition
New Moon
Asteroid 2 Pallas at opposition

6 Messier 94 is well placed
The Jewel Box cluster is well placed

9 Close approach of the Moon and Mars

10 Supernova SN2019dfa discovered
Conjunction of Venus and Neptune
Mercury at aphelion
Jupiter enters retrograde motion

11 Mercury at greatest elongation west

12 Moon at First Quarter

13 Mercury at dichotomy
136199 Eris at solar conjunction
Close approach of the Moon and M44

14 Centaurus A is well placed

15 Omega Centauri is well placed
The Whirlpool Galaxy is well placed

16 136108 Haumea at opposition
The Moon at perigee

17 Messier 83 is well placed

18 Venus at aphelion

19 Messier 3 is well placed
Full Moon

22 The Moon at aphelion
Uranus at solar conjunction

23 Lyrid meteor shower 2019
Close approach of the Moon and Jupiter

24 Messier 101 is well placed
π-Puppid meteor shower 2019
Asteroid 44 Nysa at opposition

25 Close approach of the Moon and Saturn
Lunar occultation of Saturn

26 Moon at Last Quarter

28 The Moon at apogee

30 Saturn enters retrograde motion

Collected Observations (and thoughts) – Gary Walker

Latest Observations – Posted 30 January

Today, I could see that Venus was now definitely a crescent 🌙 - a noticeable change, even since last week! Again, I found Venus in the daytime, about 2.20pm.

The Sun has had fewer spots on it, lately.

For once, the late evening was fairly clear, with only some nuisance cirrus clouds early on, which occasionally threatened, later on. I had a look at some Planetary Nebulae such as NGC 2238, 1535, IC 418, etc.

I saw that Mira, had brightened up significantly since the beginning of January, and was now much brighter than the magnitude 9 star immediately adjacent to it. However, R Lepus seems to be at its minimum!

I could see the faint companion star of Rigel, appearing very close to Rigel, even at 300X.

Mars, Jupiter and Venus are still providing a magnificent spectacle in the evening sky and, best of all, there were no dewing problems, even after being out for about two hours!

London Astrofest - Posted 8 February

Yesterday, I made my usual visit to the London Astrofest, which is still held at the Kensington and Chelsea Town Halls.

There were a fair number of stands, but it is disappointing that, over the years, many bookstalls such as "Earth and Sky", "Armagh Planetarium" and "The Webb Society have disappeared. Even "Cambridge University Books" and "Telescope House" have gone in recent years!

The only bookstall left now is "Springer Books" which remains my main go-to stall!

On the plus side, "The British Astronomical Association", the "British Inter-Planetary Society" and the "Astronomy Now" stands still have a few books!

The only surviving stands from when the Astofest began in 1992, are "Astronomy Now" (not surprising, given it sponsors the London Astrofest every year!), the "British Astronomical Association", and "Popular Astronomy".

Incidentally, today, it is exactly 50 years since I obtained my 60mm refractor from "Dixons" in Sutton, on 8 February1975! I used this telescope regularly for about 32 years, until February 2007 when I got my 8" SCT at the Astofest! I still have the refractor, although I rarely use it nowadays; it has become a bit the "worse for wear", although the optics are still fine!

Whilst having some limitations, I could still see quite a bit with the 60mm telescope, including the Moon, Sun, Mercury, Venus (I could see all of its phases), Mars, Jupiter, and Saturn. I could just pick out dark features on Mars around opposition time, as well as the Equatorial Belts and moons of Jupiter, and the rings of Saturn.

I could also see most of the Messier Objects, especially open star clusters, globular clusters, the Orion Nebula, and a couple of planetary nebulae and galaxies. It is notable that I had hardly seen any NGC Catalogue objects, and the only one that I DID see, was the Perseus Double Cluster! All the others were either too faint, or too difficult to find as, of course, this telescope didn't have a GOTO system on it!

The telescope has three eyepieces giving magnifications of 28X, 56X, and 177X. Whilst the 177X one was a bit too much magnification, I could still use it to see the dark features on Mars, and the rings of

Saturn. At least, it wasn't an unreasonably excessive power, such as 600X, as seen on so many such telescope. It also came with the obligatory eyepiece "solar filter", of the time!

Save Herstmonceux Observatory - Posted 8 February

The Herstmonceux Observatory is threatened with closure, as Queen's University is not renewing its lease on this site, after 2026.

There is an online petition called "Save Herstmonceux Observatory", which you can sign if you want to try and save it from closure

In passing, it's worth recalling that a number of Society members (including yours truly) visited the observatory in August 2018.

Latest Observations and News - Posted 14 February

Once again, there has been another awful week of constantly overcast skies, with even the Sun being totally invisible on most of these days, never mind actually observable!

Today, however, the skies finally cleared, and I was able to observe Venus, for the first time since 6 February. Venus was now a beautiful crescent 🌙 and noticeably changed in just a week! At this part of the Venus current apparition, it is the most exciting time, as Venus becomes a thinner and thinner crescent 🌙 and also larger and larger in angular size! This is the only time that Venus is really interesting; unfortunately, this period only lasts for a fairly short time.

I observed Venus at about 3pm and noted that it is now only about 27% phase.

Is a Giant Asteroid impact imminent? – Posted 14 February

I saw on the BBC News this evening about an Asteroid discovered last year, known as 2024 YR4, MIGHT hit the Earth on 22 December 2032!

This asteroid is between 40 and 90 metres in size (130-300 feet) and present predictions give it a 2% chance of it hitting the Earth. This probability may diminish to nothing as the asteroid's orbit is better evaluated!

Some predictions state that, if it hits, it could do so somewhere in a line from South America, through the Atlantic, Africa, India, or China!

At maximum size, it may be a "City Killer", equivalent to the Tunguska impact in Siberia in 1908. However, the long (almost 8 year) timeframe may give the World time to prepare for it. If action is not taken to deflect or destroy it, the area of impact can be evacuated.

The James Webb Space Telescope, as one of a number of sensors, is to study its properties.

If the worst happens, may I wish you a Merry Christmas 2032!

Mars and Venus - Posted 23 February

Yesterday, I observed Mars. It has now shrunk to 11.5' arcseconds, but I could still just see Syrtis Major, which was centred on Mars, at 300X. The feature was just detectable at 100X, too.

Venus is now shrinking in phase whilst growing in size! It was now about 20% in phase.

I also saw that Mira was visible in my finderscope. It must now be approaching its maximum magnitude, and has brightened up significantly since January, when it was only about magnitude 9!

The Ashen Light of Venus – Posted 25 February

Over the past three hundred years, when Venus becomes a crescent 🌙, astronomers have reported sightings of this phenomenon of the "Ashen Light" on Venus.

It appears similar to that with the crescent 🌙 Moon, where the shadowed part shows up dimly. This effect is easily seen at New Moon, where the dark, unilluminated, side of the Moon shows up very clearly, making a beautiful sight with the naked eye and in binoculars. In this case, it is caused by the bright Earth illuminating the lunar surface - in the case of Venus, however, there is no Moon to illuminate its dark side!

Theories for the cause of the Ashen Light range from a 19th century astronomer claiming that it was the Venusian inhabitants creating fires to celebrate the selection of a new emperor, to more scientific theories! These include Aurora on Venus, airglow, lightning strikes, volcanic eruptions, and the heat from the hot surface glowing. However, no one is sure, as no one has ever managed to image this phenomenon! So, it is a toss-up between a real phenomenon, and purely an optical illusion!

It also appears erratically and is apparently more common during active sun periods (as now). Sir Patrick Moore was one who was sure of seeing this phenomenon!

I have tried to see this a couple of times lately, when Venus was in a dark sky, but couldn't see it. However, I think that I have managed to see it in the past, by putting the bright crescent 🌙 of Venus just out of the field of view, and then slowly bringing it back in, to see if I could glimpse it. By doing this, I thought that I could see the effect. It is recommended to use an occulting bar in your telescope, in order to hide the blazing crescent 🌙 of Venus, so that the Ashen Light can show up.

The parade of the bright Planets – Posted 25 February

At present, the bright planets are all visible in the evening sky, with Venus being the most brilliant, second only to Jupiter, higher up, and Mars is still bright and not too far from Jupiter.

Saturn has, unfortunately, all but finished now, as by the time it is dark enough to see it, it is then too low in the sky for me to see it (a typical Catch 22 situation, or yet another example of Murphy's Law)

This is unfortunate, as the rings go edge on in March and, although we have experienced the rings being nearly edge on, we won't get to follow them along to see how long that we can see them in our telescopes before they disappear!

I last saw Saturn on 7 January, but now it has rapidly sunk down into the sunset glow. In recent times, the rings have appeared like bars of light, or handles sticking out to either side of Saturn (similar to what Galileo saw)

Even in Galileo's telescope, he could see that there was something odd about Saturn, and he thought that he was seeing two moons to either side of Saturn. Then they disappeared altogether (as we know now, the rings went edge on, then, too!). He was even more confused when they reappeared again later on!

His telescope was, of course, not good enough to resolve the rings, properly. However, in fairness to him and the other early telescope observers, nobody expected a Ring system around Saturn, and it was only with better telescopes that could resolve them, that their true nature was revealed! I managed to see this myself in 1995, when Saturn was much better placed.

The reason for the changing orientation of Saturn's Rings is down to the orbits of Earth and Saturn. Sometimes they are wide open and easy to see whilst, at other times, every 15 years, they are edge on.

The Rings are wide, but also very thin, so they can actually disappear from view, even though large telescopes. This can make for a very strange looking Saturn!

As it is edge on, there have been shadow transits of some of its moons, including its largest, Titan. Unfortunately, when I tried to observe this with my telescope, I couldn't see the shadow transits of Titan. This was no doubt due to the fact that Saturn is further away and dimmer than Jupiter, so it would take a larger telescope than my 8 " SCT, to resolve it. Also, Saturn was getting lower in the sky, so atmospheric conditions were poorer. However,when Saturn reappears, the rings will still be nearly edge on and will be for some time to come!

It is worthy of note that when observing the changing phases of Venus, the movement of the 4 Galilean Moons around Jupiter, and the rings of Saturn, we are following in Galileo's footsteps!

Later in the day, there was a (quite long) item at the end of the main BBC news describing the "Planetary Parade" currently on view. Dr Robert Massey of the Royal Astronomical Society and Prof Catherine Heyman, the Astronomer Royal of Scotland were explaining to viewers the significance of the event.

At present, there are 7 planets visible in the evening sky, and the news item made much of the fact that this would be the last time that we would see such an event until 2040. As is often the case, the emphasis was on "Big Numbers", and “rarity” rather than how the event has come about.

Doubtless, some Astrologers may read something into this event!

In reality, however, this "parade" is not quite as impressive as it would appear from the Media coverage. Only 3 planets are easily visible to the naked eye (Venus, Jupiter, and Mars). Mercury and Saturn are very low down in the sky, so are very difficult to see, whilst Uranus and Neptune need a telescope, in order to see them!

This time, last year, there was a marked dearth of planets in the evening skies, and only slowly over the intervening 12 months, did they start to reappear. At present, Venus is still easily visible in the evening sky, whilst Jupiter and Mars are high up and well placed.

Continued media interest in “Planetary Parade” – Posted 26 February

BBC News was still mentioning the "Planetary Parade", today. They have often showed unrealistic illustrations of all the planets lined up next to the Sun, which of course we won't actually see. They also showed the sizes of the planets, in relation to each other, which was accurate, but, again, not what we will actually see in the sky. The event also featured on other media news and Facebook.

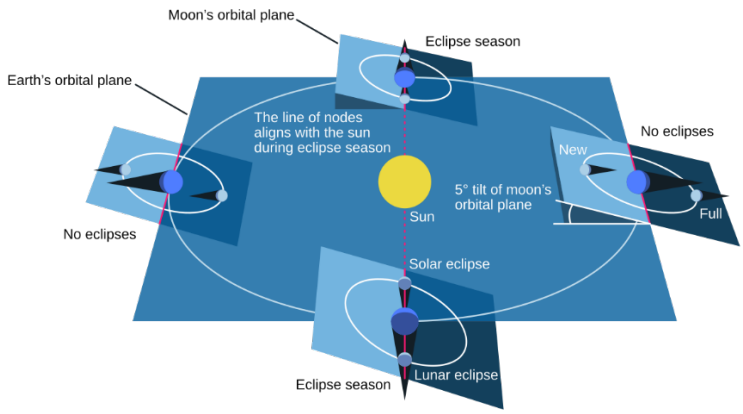
For once, the weather has been quite clear, both tonight and last night.

In other news, the asteroid threatening Earth in December 2032, is no longer deemed a risk!

Object of the month - Partial Solar Eclipse 29th March 2025 - Martin Howe

As we all know, a solar eclipse occurs when the Moon passes directly between the Earth and the Sun, casting a narrow path of a shadow on Earth. The mechanics behind this phenomenon depend on the relative orbital positions and sizes of the Sun, Moon, and Earth.

By definition, if the Moon is between the Earth and the Sun, it is a new Moon, and so solar eclipses can only happen at a new Moon. However, a new Moon occurs once every (lunar) month – about 29 ½ days - and yet we do not see a solar eclipse every month (how great would that be?!!). This is because the Moon's orbital plane around the Earth is tilted about 5° to our own orbital plane and so a solar eclipse will only occur if the new Moon coincides with the Moon being at the point where its orbital plane intersects with our own orbital plane. In technical terms, this point is known as a node, and the projection of our orbital plane onto the sky is known as the ecliptic – see the diagram below. In other words, only when the node lies between us and the Sun at the new Moon will be see a solar eclipse.



Solar eclipses will only occur when the new Moon is on the ecliptic. Diagram: Wikipedia (creative commons)

The Ecliptic

For an observer on the Sun's surface, the ecliptic is the path the Erath traces out against the background stars; and for us, it is the reciprocal – the path the Sun takes across the sky. All of the planets in our solar system were formed within the same proto-planetary disc of dust and gas, and so all of the planets orbit the Sun in broadly the same plane – hence the path of the planets through the sky lie very close to the ecliptic (to within about ±7°)

There are four different types of solar eclipses:

1. Total solar eclipse, where the Moon is at the orbital node, and the Moon is at or close to perigee (see text box below)
2. Partial solar eclipse, where the Moon is slightly off the exact nodal point meaning that only part of the Sun's surface is covered by the Moon
3. Annular solar eclipse, where the Moon is at a nodal point, but is close to apogee
4. A hybrid solar eclipse. A rare event, where the curvature of the Earth along eclipse path is significant enough to materially change the apparent size of the Moon such that for some observers on the path the eclipse is total, but for others, it is an annular eclipse

Perigee and Apogee
The Moon's orbit about the Earth is not an exact circle, but is slightly elliptical (with an eccentricity of 0.055, on a scale of 0 to 1 where a value of zero would represent a perfect circle)
When the Moon is at its closest point to the Earth in its orbit, this is known as perigee; and at its furthest it is at apogee. A full Moon at perigee gives us the "Supermoons", as the Moon is closer to us and so appears slightly larger. By the same logic, a solar eclipse at lunar perigee gives the longest period of totality (the maximum of which is about 7 minutes)

Partial Solar Eclipse – 29th March 2025

This month sees a partial solar eclipse, visible from London:

10:07 First contact
11:03 Maximum eclipse (about 42% magnitude, 30% obscuration)
12:00 Last contact

Note that there are often two different measures cited for the "size" of the eclipse:

- Obscuration - the fraction of the Sun's area occulted by the Moon
- Magnitude - the fraction of the Sun's diameter occulted by the Moon

Viewing the eclipse

We should all be well aware of the dangers of looking directly at the Sun with our naked eye. Quite simply, to do so could result in permanent damage to the eye or even blindness. However,
there are many ways to safely observe (and photograph) the eclipse, including:

- Projection through binoculars or a telescope onto a piece of card
- A simple pinhole projection onto card
- A "white light" solar filter (sheets of these can be purchased from reputable astronomy dealers relatively cheaply).
- Pre-made cardboard-mounted solar eclipse glasses are also relatively cheap to purchase, again from a reputable source
- A dedicated solar telescope.

Finally, a note for your diary, there will be a total solar eclipse crossing Spain in August 2026. If you can't make it to Spain (probably pay to start booking now if you can!) then the tip of Cornwall will see an eclipse magnitude in excess of 95% (92% from London).

The image below was taken of the 25th October 2022 partial solar eclipse as seen from London. This reached a magnitude of about 26% (15% obscuration), and so the 29th March eclipse this year should see approximately twice as much of the solar disc obscured. This image was taken with a Canon 80D DSLR through a 400mm telephoto lens fitted with a white light filter for an exposure of 1/800th of a second, f/11, and ISO 100.

Will the US get to Mars quicker if it drops or delays plans to visit the Moon?

Acknowledgement: This article was written by Ian Whittaker, Senior Lecturer in Physics, Nottingham Trent University, and was first published in THE CONVERSATION on 29 January 2025. It is republished in full under a Creative Commons Licence. The original article, with additional links and images can be found here: *https://theconversation.com/will-the-us-get-to-mars-quicker-if-it-drops-or-delays-plans-to-visit-the-moon-248046*

The Artemis program has been Nasa's best chance to get "boots on the Moon"again. But with the new US administration taking guidance from tech entrepreneur Elon Musk, who is focused on Mars colonisation, will they end up abandoning or pushing back lunar missions?

For example, there's been speculation that returning US president Donald Trump may cancel the Space Launch System rocket, which Nasa intended to use to get from the Moon to Mars. But is this approach likely to help them get to Mars quicker?

The last human presence on the lunar surface was Apollo 17 in 1972. So, you may imagine that it should be easy for the US to return. However there have been plans to once again send people there since 2004, which have changed name with each incoming president, until its current incarnation as the Artemis program.

The 2022 Artemis-1 test flight was successful in its mission to send an unmanned satellite around the lunar orbit and return using the new SLS rocket system. But Artemis-2, which will carry crew, is not scheduled for launch until 2026. When we consider private companies and other nations, this is comparatively slow progress.

The first successful landing of a spacecraft on the Moon by the Indian Space Agency, Isro, took place in 2023 with Chaandrayan-3, which was an amazing achievement with a low budget. China landed in 2013 with Chang'e 3, and Chang'e 4 in 2019 on the dark side.

Russia have previously had landers on the Moon. Their more recent attempt at a lunar landing with Luna-25 was unsuccessful though. There are also future lander missions planned by the European Space Agency with Argonaut, a private Israeli company and other private industries. Clearly, there is no shortage of potential competitors which could eventually develop to send humans too.

Implications for Mars

So, would turning to Martian exploration be a sensible move instead of heading for the Moon? It would likely mean abandoning the Lunar Gateway project, a space station in orbit around the Moon where astronauts could live. But as this is not planned until 2027 at the earliest, this would seem acceptable.

However, the difference between going to the Moon and going to Mars is like the difference between walking to the end of your road compared to walking to another country.

Besides the incredible difference in distance (the distance to travel to Mars is 833 times greater than that of the distance to the Moon), the time taken to get there is far longer as well. The optimal lunar launch conditions repeat once a month. And you could still launch at times that are not ideal.

The optimal fuel route for Mars involves arriving when the two planets are roughly on opposite sides of the Sun. This launch window repeats every 18 months, and the journey time of nine months means any problems onboard will need to be fixed by the crew, with no rescue option. Faster routes can be achieved (roughly six months) but this then becomes very energy intensive.

This is why the lunar gateway would come in handy, allowing astronauts to take off from the Moon, away from the Earth’s immense gravity, and head to Mars from there. Of course, the material for the gateway would need to be sent to the lunar gateway first. But by splitting the energy requirements up it means slower, but more efficient, propulsion methods can be used for part of the Mars journey.

There is no doubt that, with some work, SpaceX will be able to make a landing on Mars. But will they be able to safely take people there and get them back? As a company the idea of profit will be a strong factor, along with astronaut safety. We only have to look at some of the more recent Boeing problems (astronauts have been stuck on the International Space Station for seven months at time of writing) to see that private companies may want to slow down a bit when it comes to transporting people.

This is unlikely to happen though, with the considerable influence of Musk on the White House administration, and the suggestion of fellow billionaire Jared Isaacman (a private astronaut) as the new head of NASA.

Critical decisions

So, two options for Nasa to choose from: either keep going with their Artemis program and abandon the Lunar Gateway or aim for Mars and be primarily dependent on Musk.

Funding both options will likely mean that neither ever happens. Of course, the Mars mission would be easier if the gateway was already present at the Moon.

The timelines involved here are important. SpaceX states that it will send five uncrewed Starships to Mars next year with an aim to send humans to Mars in 2028. This seems ambitious, particularly as it involves refuelling in orbit, but if additional funds and material are put towards the project it could potentially be sooner than this.

As the lunar gateway would be built at the earliest in 2027, then it'd be unlikely to be operational in 2028 anyway. So prioritising Mars exploration over the lunar gateway may indeed get us to Mars quicker – but it will be risky.

If the US pulls out of plans to explore the Moon, other nations can expand their presence in those areas more easily – with the potential to have an easier route to launch to Mars. These are likely to be on much longer time scales though, but if Musk fails to get humans to Mars in the next few years, these countries may have an edge.
The conditions on Mars are slightly more favourable for human presence, with at least some atmospheric pressure and the potential for mining water. But as many studies have shown, it has no potential for terraforming, the process of altering a planet to make it more habitable for humans.

The increased distance from the Sun also means that solar panels are slightly less effective, and Mars is not rich in deposited solar Helium-3, which can be used as a fuel for nuclear fusion.

Of course, the challenge is what excites many people, and it may be a risk worth taking. But this decision should be left with the experts in the field, rather than politicians and billionaires.

Table of Lunar Missions – 2020 to date

Name	Nation	Launch	Arrival	Type	Results
Chang'e 5	China	23Nov2020	01Dec2020	Sample Return	Successful
Danuri (Korean Pathfinder Lunar Orbiter)	South Korea	04Aug2022	16Dec2022	Orbiter	Successful
Artemis I	USA	16Nov2022	21Nov2022	Flyby	Successful; first flight test of SLS rocket and Orion capsule
Hakuto-R Mission 1	Japan (ispace)	11Dec2022	21Mar2023	Lander	Unsuccessful
Emirates Lunar Mission	United Arab Emirates	11Dec2022	21Mar2023	Rover	Unsuccessful
Chandrayaan-3	India	14Jul2023	23Aug2023	Lander and Rover	Successful; First spacecraft to soft land near the lunar South Pole.
Luna 25	Russia	10Aug2023	19Aug2023	Lander	Unsuccessful
SLIM	Japan	06Sep2023	25Dec2023	Lander and Rover	Soft landing, but with limited use of solar panels.
Peregrine Mission 1	USA (Astrobotic)	08Jan2024	N/A	Lander	Unsuccessful; First launch under NASA's CLPS program
IM-1 Odysseus	USA (Intuitive Machines)	15Feb2024	22Feb2024	Lander	First commercial soft lunar landing. The lander tipped over interfering with communications.
Chang'e 6	China	03May2024	01Jun2024	Sample Return Mission	Successful. First sample return from the lunar far side.

Blue Ghost 1	USA (Firefly Aerospace)	15Feb2025	Expected 02Mar2025	Lander	Currently on its way to the Moon.
IM-2 Athena	USA (Intuitive Machines)	26Feb2025	Expected 06Mar2025	Lander	Currently on its way to the Moon
NASA Lunar Trailblazer	USA	26Feb2025	Jun-Sep 2025	Orbiter	On its way to the Moon using low energy transfer

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Up Next:

NEXT MEETING: 8pm Friday 14 March – Nonsuch High School

Prof. Sarah Matthews from UCL will give a talk entitled "Up Close and personal: the Sun, our local star". There will also give a presentation on the sky at night for the coming month.

NEXT USER GROUP:

Suspended until further notice.

NEXT DENBIES OBSERVING SESSION:

The next sessions, allowing for moon rise & set times and cloud conditions, should be sometime around the new moon which is on 29 March.

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 26 March to 3 April

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 alerts