JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

May 2022 EDITION
Editor: ewellastro.editor@gmail.com
Email: ewellastro@gmail.com
Website: https://www.ewellastronomy.org

Editorial

Welcome to the May edition of Janus. Our speaker this month is Michael Maunder. Once again, at the time of writing, the subject of his lecture isn't known - our speakers obviously want to keep us guessing! - but, whatever, it is, I'm sure it will be of interest to members. As has become the new norm for our meetings, it will be a "hybrid" one with the option to attend either in person or via Zoom.

Interactions outside meetings are currently focussed on the re-launched group observing sessions at Ranmore, which continue to be well supported by members. Thus far, the weather has been kind - long may this be the case. It is, of course, inevitable that as the evenings get lighter (and warmer?), sessions will begin later and, unless supported by "night owls", be of shorter duration. Speaking personally, I've always found it perverse that the most productive observing sessions (in terms of duration and viewing conditions) tend to occur when it might be more attractive to remain indoors. Additional group sessions at Warren Farm remain a possibility but, even though they are likely to be more ad-hoc, they will require someone to organise them. At present, there are no signs of a resumption of User Groups at Nonsuch.

Calibration and final commissioning of JWST continues to go well, prior to commencement of routine science operations in July. The latest milestone was reached on 7th April when Webb's Mid-Infrared Instrument (MIRI) – a joint development by NASA and ESA – reached its final operating temperature 6.4 kelvins (minus 267° C) All 4 of Webb's instruments are cooled, but MIRI is the most exacting. For all the latest information on JWST go NASA's JWST site: *https://www.jwst.nasa.gov/*

John

skyUpdate
What's up this month?

The Solar System May

MERCURY: begins the month visible as an evening object, having recently passed greatest elongation E. Becoming visible around 21:01 BST, 11° above the W horizon, as dusk fades to darkness, it will then sink towards the horizon, setting 2 hours and 10 minutes after the Sun at 22:29. Visibility becomes progressively worse as the month progresses and by the end of the month it is extremely difficult to see since it is very close to the Sun, at a separation of only 13° from it.

VENUS: is visible as a morning object throughout the month, having recently passed greatest elongation W. It begins the month visible in the dawn sky although, rising at 04:27, it will be difficult to observe, since sun rise is only an hour later, and it reaches its highest point in the sky during daytime and is no higher than 5° above the horizon at dawn. By the end of the month, it remains just about visible as a morning object, now well past greatest elongation W and returning closer to the Sun. Rising at 03:33, it will be difficult to observe as sunrise is still only just over an hour later by which time it will be no higher than 6° above the horizon.

MARS: is currently emerging from behind the Sun and, throughout the month, is difficult to see. It will reach its highest point in the sky during daytime and be between 5° and 9° above the horizon at dawn.

JUPITER: begins the month having recently passed behind the Sun at solar conjunction. It will be difficult to see, reaching its highest point in the sky during daytime and being no higher than 6° above the horizon at dawn. By the end of the month, emerging from behind the Sun, it is visible in the dawn sky, rising at 02:38 BST – 2 hours and 11 minutes before the Sun – and reaching an altitude of 15° above the E horizon before fading from view as dawn breaks around 04:22.

SATURN: is currently emerging from behind the Sun and begins the month not observable

– it will reach its highest point in the sky during daytime and is no higher than 10° above the horizon at dawn. By the end of the month, it is visible in the dawn sky, rising at 01:30 BST – 3 hours and 19 minutes before the Sun – and reaching an altitude of 17° above the SE horizon before fading from view as dawn breaks around 03:54.

URANUS: begins the month extremely difficult to see as it will soon pass behind the Sun at solar conjunction and is very close to the Sun, at a separation of only 3° from it. By the end of the month, having recently passed behind the Sun at solar conjunction, it remains extremely difficult to see reaching its highest point in the sky during daytime and being 9° below the horizon at dawn.

NEPTUNE: begins the month very difficult to see. Having recently passed behind the Sun at solar conjunction, it will reach its highest point in the sky during daytime and be 4° below the horizon at dawn. By the end of the month, emerging from behind the Sun, it remains very difficult to see, reaching its highest point in the sky during daytime and being no higher than 2° above the horizon at dawn.

MOON PHASES:

New Moon	30 Apr
First Quarter	9 May
Full Moon	16 May
Last Quarter	22 May
New Moon	30 May

Notable Events:
Observation of some of these events may require a telescope, although some will be visible with the naked eye. More information with times at https://in-the-sky.org

May

6 η-Aquariid meteor shower 2022
8 η-Lyrid meteor shower 2022
12 M5 is well placed
16 Total lunar eclipse
18 Conjunction of Mars and Neptune
22 Conjunction of the Moon and Saturn
Close approach of the Moon and Saturn
24 Conjunction of the Moon and Mars
Close approach of the Moon and Mars
25 Conjunction of the Moon and Jupiter
Close approach of the Moon and Jupiter
27 Conjunction of the Moon and Venus
Close approach of the Moon and Venus
Lunar occultation of Venus
28 Mercury at highest altitude in evening sky
29 Conjunction of Jupiter and Mars
Close approach of Jupiter and Mars

Collected Observations (and thoughts) – Gary Walker

Latest Observations - 7 Apr

As I noted last month, the Sun has well and truly woken up from its long slumber, with plenty of sunspots, some very large, on most days; it has also been very active in Ha light. I estimate from my observations, that activity on the Sun started to ramp up after the middle, or towards the end of, 2020.

On 6th April 2022, and earlier, I saw several long filaments upon the Sun in Ha light. They seemed to be about 1/10th of the Sun's diameter, (which is a massive 864,000 miles!), so at least 2 of the filaments must have been in the order of 80,000 miles long. This shows the staggeringly large scale of objects upon the Sun - something we tend to forget!

Viewed in Ha light, filaments appear as hairs, lines, or rods snaking across the Sun, and they are just prominences that are silhouetted against the Sun's disk, so they appear dark! Sometimes a filament can extend to the limb of the Sun, and join up with a prominence on the limb, of which it is part, and this is known as a filaprom! When you see this phenomenon, it is immediately clear, what the nature of a filament really is.

Some trials and tribulations of being an amateur astronomer - 7 Apr

A few nights ago, I set up my telescope for GOTO operation, intending to look at the Virgo Galaxy Cluster. The temperature was very cold, probably below freezing, as I could see some snowflakes or ice balls lying on a garden table, which had not melted!

The battery power in my present telescope batteries was around 50%, so that seemed OK. However, I found that the telescope was only labouring and grinding along, and it kept on going out of alignment. On checking the battery power, it said it had declined to about 37%, so I thought that it was time to change the batteries. After several attempts at switching off the power and starting again, I finally threw in the towel when, during the alignment procedure, the telescope was pointing well below the alignment star of Vega!

Unfortunately, I hadn't got a replacement set yet, so it meant that this clear night was wasted. I then ordered some new batteries, but I decided to check the power of the existing batteries in the daytime before dumping them. On doing this, I found that they were giving a much higher reading of over 50% so, on the next clear night, I decided to try them one last time, as I hated the thought of wasting them. To my surprise, they worked perfectly, this time! This was, however, a much warmer night, so it was probably the very cold temperatures on the other night, that made the batteries fail on that occasion.

The trouble with checking battery power is that once the power level has gone down, when I try and check it, I get a false reading, much higher than it really is, only to see it shrink down in a few minutes to its much lower, true level. This makes it difficult to determine the initial true power level, which is frustrating! Also, in the daytime, the temperature is much warmer than during the night, which means any reading is potentially higher than it would at night (when, of course, you are wanting to observe in GOTO). Only when the batteries are fresh will they give a much more accurate reading of 100%, or just below. There is nothing more satisfying than seeing a battery reading of 100%!

John Axtell talk - 9 Apr

The speaker at our 8th April meeting was John Axtell, who many will remember for his unique talk last November, "Sputnik in Context". We also remember his song from the Goons about the Sputnik just after it was launched in 1957, about "our glorious satellite moon!". This now seems entirely appropriate, in the light of the Russian invasion of the Ukraine. Indeed, he spoke about the effects of the sanctions on space missions and Astronomy.

His main talk though, was on astronomy with binoculars. Like before, he brought along several “props”, including at least 5 pairs of binoculars, of which 2 were mounted on tripods. He also had a pair of roof prism ones, similar to opera glasses.

There were about 26 members physically present at this meeting and at least another 6 or so, on Zoom. Thus, it was still a "hybrid" meeting, but we are still a lot luckier than John's Guildford group, which STILL only "meet" on Zoom!

He also pointed out some of the top tips that Patrick Moore always said for getting into astronomy, such as learning a new constellation each night, and buying a pair of binoculars. In addition, Patrick Moore said to join an astronomical society! All these tips were essential, before considering buying a telescope.

Unfortunately, John said that this would be his last ever talk to a society, as he had other things going on.

My Astronomy with binoculars - 9 Apr

John Axtell talked about Astronomy with Binoculars and showed us books by Steve Tomkin on the subject. Patrick Moore and James Muirdan also both wrote books on this subject.

In my case, my first pair of binoculars was a Galilean type 8 X 50, which, sadly, gave a narrow field of view, and were not very good; I bought them in 1973, for £3.47!

However, I often used to look through the binoculars that were chained to tables outside "Dixons" in Sutton, and one could look down the High Street to the Eagle Star office block. I could see that these were much better than mine, so I started saving up and, in 1976, I finally managed to buy a pair of Haminex 10 X 50 ones, which I still use today! These cost me £15.95 at the time, and they were in a sale at "Debenhams" in Croydon.

When I first used them at night, I pointed them up at Cygnus, and I was amazed at how many stars were visible through them. Of course, I was looking along the Milky Way! They have a much wider field of view than the previous ones, 5.5 degrees. I could see a stereoscopic effect with them, and even on looking at trees in the daytime, it made trees stand out at different distances, rather than appearing as just one flat plane. Also, as John Axtell pointed out in his talk, I could see the stereoscopic effect, particularly during a total lunar eclipse, where I could see stars right up close to the Moon!

In 2007, I bought a pair of 11 X 80 binoculars. I originally bought a tripod for these, but preferred to just hand hold them, even though they are heavy.

I also obtained some "Sunagor" Zoom binoculars, of 10X - 30X, but they were not nearly as good as my other binoculars. As I zoomed in, the field of view became smaller and dimmer, and I also needed to refocus. Perhaps the most annoying thing about these binoculars, though, was the focusing wheel, which on at least two subsequent pairs of binoculars, invariably jammed, or else broke, so that focusing was no longer possible! This happened after only a few months of use, whereas my 10 X 50 ones, still work fine today, along with the 11 X 80 ones.

Zoom binoculars are still sold today, and some have a large zoom range - as much as 10X to about 100X, or so - but they may well not live up to expectations.

One particularly annoying aspect of the adverts for binoculars that appear in newspapers and magazines are claims of "1000% power". This is clearly a false claim, as these binoculars only magnify 10X. However, I have noticed that they now put the true magnification in brackets, to avoid getting authors into trouble!

I have no idea how 10X got up to 1000%; note that the '1000' is not actually a magnification - it is written as "%" (yes Percent!) - but this is very deceiving to new people buying their first binoculars. Just like with telescopes, one should never buy any that are principally advertised by their magnifications, as unscrupulous sellers expect people to be impressed by high magnifications, and Big Numbers!

It is, however, not surprising that this happens; I, too, when I was a child, expected that the higher the magnification, the better the view would be. One would expect that a telescope with a listed magnification of 675X would give a stupendous view - unfortunately, this is not the case, particularly with small 60mm refractor telescopes. This is because, due to optical laws, one cannot get a clear magnification more than twice the aperture of the scope, thus a 60mm system scope could not give more than 120X. Higher powers, just make the view dimmer and fuzzier!

Another type of deception used in advertising for binoculars is the heading, "See for 35 miles", (it used to be "See for 50 miles"). This is another typical example of unscrupulous advertisers using Big Numbers to impress inexperienced potential buyers. Such statements are totally meaningless - if you are in a closed room, you can only see a few feet.   Even if you are outdoors, at ground level, you will only be able to see a few miles - the horizon at sea level is 2.9 miles away - with, or without, using binoculars. At high altitudes, you may see tens of miles, or more. And yet, if you look up at the night sky, you can see untold billions, (or rather, trillions of miles), even with the naked eye!

How do advertisers decide on how far you can see with their binoculars, and how come their figures are so precise?   The bottom line is that you cannot see further with binoculars, than with your naked eyes. However, binoculars can show things at a distance, either distant views, or astronomical objects, more clearly than your naked eye.

With my binoculars, I have often found Comets - Halleys Comet, for one - and they have advantages over telescopes. The view of the bright NEOWISE Comet of 2020 was much better in my binoculars, as I could get the long tail in, whereas telescopes with their smaller fields of view cannot accommodate the full picture. The same, of course, was true with Comets Hyakute, and Hale-Bopp.

Similarly, with the open star cluster of the Pleiades (M45), it is beautifully well framed in binoculars, but a telescope has problems doing this.

On the Moon, the main craters and "maria" or "seas" are well seen using binoculars. They are, however, much more limited in use for observing planets, as their low magnifications of 7X, to about 25X, are not quite sufficient to really show the disks of Planets, much less, features upon them. That said, I have seen Venus as a crescent 🌙 with them, as well as

Jupiter, as a disk, along with the 4 "Galilean" moons.

Binoculars are far better for examining open star clusters. They can show globular star clusters, such as M13, but only as fuzzy balls, as they cannot resolve the stars in them. They can also pick up some of the brighter galaxies, such as M31, M33, and others, and can also be used just to roam along star fields, especially along the Milky Way in Cygnus.

It has been said that 7 X 50 binoculars are excellent, for astronomy, and 10 X 50 ones, as well. Both give wide fields of view without being too heavy. That said, almost any binoculars can be used for astronomy, although of course, some are far more suitable than others.

Mercury - 19 Apr

In the Spring, Mercury can always be seen for a brief time in the early evening. Consequently, this is when it is easiest to see it. Viewed with binoculars or telescope, it appeared as an orange "star".

I could just about see that it had a phase, but because it always has a small angular size (only 6.2', on 19th April), and was at low altitude, making seeing bad, assessing the exact phase from the resulting blurry "blob" was always going to be difficult. Variously, it appeared as a fat crescent, or as a half, or gibbous phase, (in fact, it was a gibbous phase, on this evening). Eventually, when it got a bit darker, I also managed to see it with the naked eye.

Planets have been thin on the ground (or rather, in the sky!), in the evening skies for quite a long time, with all the others - apart from Mercury - massing in the morning skies! Mercury is bright at these times, but due to its rapid motion around the Sun it never stays in the same place for long, and it is always low in the sky, as it never gets too far from the Sun. Some "apparitions" like this are good, but others are poorer, or else, only in the morning skies.

As I said earlier, Mercury is always small in angular size - even at its absolute maximum, such as during a Solar Transit, it never gets above 10 - 12 arcseconds. This is because, it never gets closer to the Earth than about 50 million miles, and it is usually much further away. It is also not very large - only about 3000 miles long.

Thus, it is difficult to observe well, even if you manage to find it, and observing any surface detail is very difficult, although some amateurs have produced some good results in imaging the surface details.

I saw it on several occasions last spring, aided by the fact that a neighbour had got rid of a leylandii hedge, thereby significantly improving my view to the West - North - West!

Giant Sunspots - 21 Apr

A group of giant Sunspots appeared upon the Sun, during April and, by 20th April, they were well displayed. They consisted of 3 giant spots, and a slightly "smaller" one, all with multiple umbrae and penumbra.

As usual, they were accompanied by several small spots. They first started to appear on the solar limb on 16th April, as extremely elongated spots (the "Wilson Effect"). This effect is always seen with spots close to the limb, and the same effect is visible on the Moon, with craters close to the limb.

The Sun, viewed in Ha light, has also been "busy" this month.

Object of the month – Lunar eclipse - Martin Howe

This month sees a lunar eclipse on Monday 16th May – the only lunar eclipse visible this year. However, do not get too excited, as this year's eclipse, although nominally a total lunar eclipse, will be entering totality pretty much as the Moon is setting. Totality commences about 4:29am (BST) with the moon barely 5 degrees high in the south-west sky as shown by the attached simulated view from Stellarium. Not only is it at a low altitude, but it is only about 40 minutes before sunrise, and so it will also be in a morning twilight sky.

Hence, we should consider this eclipse to be a partial eclipse, the darker umbral phase of which commences about an hour earlier at 3:27am. Even then, however, the Moon will only be about 10 degrees above the horizon at this point.

Nevertheless, if you are a morning person, and have a clear south-west horizon, these events are always great to observe and easy to do so with the naked eye or a pair of binoculars.

Partial eclipses are notoriously difficult to photograph because of the high dynamic range between the darker eclipsed portion and the brighter uneclipsed portion. In that respect the naked eye is far superior to a camera for seeing partial eclipses because of the limited dynamic range that the camera can capture in a single exposure. This means that if you are trying to take photos of a partial phase of a lunar eclipse, you have a choice to expose for the darker eclipsed portion and have the bright uneclipsed portion over-exposed; or conversely expose for the brighter uneclipsed portion and have the darker eclipsed portion under-exposed.

In this latter scenario you will then not see the typical orange glow that the eclipsed lunar surface takes on because of the refraction of light through the Earth's atmosphere, which is best seen at full eclipse.

The three images below were taken during the partial lunar eclipse of 16 July 2019.

The image on the left is at the very beginning of the umbral phase, with the encroaching umbral shadow clearly shown. Top right was taken much later during the eclipse and has been exposed for the eclipsed part of the disc, starting to show the characteristic orange glow from the refraction of the Sun's light by the Earth's atmosphere. The image bottom right was taken about the same time, only this time exposed for the uneclipsed portion of the disc, throwing the eclipsed portion into darkness. Note that the terminator because of the Earth blocking the Sun's light is less well delineated than we see for a partial phase of the normal Moon, and this again is due to the scattering of light passing through the Earth's atmosphere. The surface features on the Moon also have a lot lower contrast compared than usual.

Good luck!

Most distant star to date spotted – but how much further back in time could we see?

Acknowledgement: This article was written by Carolyn Devereux, Senior Lecturer in Astrophysics at the Centre for Astrophysics Research, University of Hertfordshire, and was published in THE CONVERSATION on 4th April. It is republished in full under Creative Commons Licence.
The original article, with additional links can be found here: https://theconversation.com/most-distant-star-to-date-spotted-but-how-much-further-back-in-time-could-we-see-180623

The Hubble Space Telescope has observed the most distant star ever seen – Earendel, meaning morning star. Even though Earendel is 50 times the mass of the Sun, and millions of times brighter, we would not normally be able to see it. We can see it due to an alignment of the star with a large galaxy cluster in front of it whose gravity bends the light from the star to make it brighter and more focused – essentially creating a lens.

Astronomers see into the deep past when we view distant objects. Light travels at a constant speed ($3x10^8$ metres per second) so the further away an object is, the longer it takes for the light to reach us. By the time the light reaches us from very distant stars, the light we are looking at can be billions of years old. So, we are looking at events that happened in the past.

When we observe the star's light, we are looking at light that was emitted from the star 12.9 billion years ago – we call this the lookback time. That is just 900 million years after the Big Bang. But because the universe has also expanded rapidly in the time it took this light to reach us, Earendel is now 28 billion light years away from us.

Now that Hubble's successor, the James Webb Space Telescope(JWST), is in place it may be able to detect even earlier stars, although there may not be many that are nicely aligned to form a "gravitational lens" so that we can see it.

To see further back in time, the objects need to be very bright. And the furthest objects we have seen are the most massive and brightest galaxies. The brightest galaxies are ones with quasars – luminous objects thought to be powered by supermassive black holes – in them.

Before 1998, the furthest detected quasar galaxies were about 12.6 billion years lookback time. The improved resolution of the Hubble Space Telescope increased the lookback time to 13.4 billion years, and with the JWST we expect to improve on this possibly to 13.55 billion years for galaxies and stars.

Stars started to form a few hundred million years after the Big Bang, in a time that we call the cosmic dawn. We would like to be able to see the stars at the cosmic dawn, as this could confirm our theories on how the universe and galaxies formed. That said, research suggests we may never be able to see the most distant objects with telescopes in as much details as we would like – the universe may have a fundamental resolution limit.

Why look back?

One of the main goals of JWST is to know what the early universe looked like and when early stars and galaxies formed, thought to be between 100 million and 250 million years after the Big Bang. And, luckily, we can get hints about this by looking even further back than Hubble or the JWST can manage.

We can see light from 13.8 billion years ago, although it is not star light – there were no stars then. The furthest light we can see is the cosmic microwave background (CMB), which is the light left over from the Big Bang, forming at just 380,000 years after our cosmic birth.

The universe before the CMB formed contained charged particles of positive protons (which now make up the atomic nucleus along with neutrons) and negative electrons, and light. The light was scattered by the charged particles, which made the universe a foggy soup. As the universe expanded it cooled until eventually the electrons combined with the protons to form atoms.

Unlike the soup of particles, the atoms had no charge, so the light was no longer scattered and could move through the universe in a straight line. This light has continued to travel across the universe until it reaches us today. The wavelength of the light got longer as the universe expanded – and we currently see it as microwaves. This light is the CMB and can be seen uniformly at all points in the sky. The CMB is everywhere in the universe.

The CMB light is the furthest back in time that we have seen, and we cannot see light from earlier times because that light was scattered, and the universe was opaque.

There is a possibility, however, that we can one day see even beyond the CMB. To do this we cannot use light – we will need to use gravitational waves. These are ripples in the fabric of spacetime itself. If any formed in the fog of the very early universe, then they could potentially reach us today.

In 2015, gravitational waves were detected from the merging of two black holes using the LIGO detector. Maybe the next generation space-based gravitational wave detector – such as ESA's telescope Lisa, which is due for launch in 2037 – will be able to see into the very early universe before the CMB formed 13.8 billion years ago.

Up Next:

NEXT MEETING: 8pm Friday 13 May 2022 - Nonsuch High School

Michael Maunder will talk about a subject yet to be confirmed. Attendance via Zoom will also be possible for those members preferring not to attend in person.

Ron Canham will also deliver his Sky at Night presentation for the month to come.

NEXT USER GROUP:

Suspended until further notice.

NEXT DENBIES OBSERVING SESSION:

The next session, allowing for moon rise & set times and cloud conditions, will be sometime around the new moon on 30th May. The precise date will be advised by email and WhatsApp a few days in advance

Meet at The Stepping Stones pub in West Humble about 6:30pm and go up to Ranmore around 7pm

AD HOC OBSERVING AT WARREN FARM:

These will be at short notice when the weather is favourable. Please watch our WhatsApp feed for alerts.