JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

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Editorial

Welcome to the April edition of Janus. This month's lecture, to be given by Professor Sarah Matthews from UCL, is entitled "Up close and personal: the Sun, our local star". There will also be the customary presentation on the sky at night for the upcoming month, although it will not be given by Ron Canham as, after being an EAS stalwart for many years, he has moved away.

As will be obvious to everyone, the weather during March has continued to be indifferent. Those who follow the WhatsApp feed will be aware that it's also been poor in New Zealand where Martin Howe has been on holiday. Closer to home, I travelled to rural France near Perigueux hoping for some warmer weather and dark skies. Now on day 5, the temperature has yet to get above 12°C and, whilst there has been sporadic sunshine, there's also been heavy rain and, to date, no clear night skies. Still, at least the wine is cheap, which helps to alleviate the disappointment!

Lunar missions continue to have mixed fortunes. JAXA reported that Japan's unmanned moon lander, SLIM, woke up on 27 Mar after surviving a second frigid, two-week lunar night, with temperatures as low as -133°C, and transmitted new images back to Earth. In stark contrast, the US lander Odysseus - the first private spaceship to successfully land on the moon – failed to wake up, even though its solar panels were projected to receive enough sunlight to turn on its radio.

Finally, Comet 12P/Pons-Brooks, which has been visible during March, reaches peak brightness on 21 April, the same day it passes perihelion.

John

The Solar System April

MERCURY: begins the month soon passing in front of the Sun at inferior solar conjunction. It will be extremely difficult to observe, reaching its highest point in the sky during daytime and being no higher than 5° above the horizon at dusk. By the end of the month, emerging into the morning sky as it approaches greatest elongation west, it remains extremely difficult to see, reaching its highest point in the sky during daytime and being 4° below the horizon at dawn.

VENUS: will soon pass behind the Sun, and begins the month difficult to see, reaching its highest point in the sky during daytime and being 1° below the horizon at dawn. By the end of the month, it remains difficult to see, reaching its highest point in the sky during daytime and being 2° below the horizon at dawn.

MARS: recently passed behind the Sun at solar conjunction. Throughout the month it is difficult to see, reaching its highest point in the sky during daytime and being on or below the horizon at dawn.

JUPITER: will soon pass behind the Sun at solar conjunction. At the beginning of the month, it will become visible at around 19:54 GMT, 25° above the W horizon, as dusk fades to darkness. It will then sink towards the horizon, setting 3 hours and 14 minutes after the Sun at 22:47. By the end of the month, it is more difficult to see, reaching its highest point in the sky during daytime and being no higher than 5° above the horizon at dusk.

SATURN: recently passed behind the Sun at solar conjunction. It begins the month difficult to see, reaching its highest point in the sky during daytime and being 2° below the horizon at dawn. By the end of the month, it is slightly easier to see, reaching its highest point in the sky during daytime, but still being no higher than 3° above the horizon at dawn.

URANUS: will soon pass behind the Sun at solar conjunction. It begins the month difficult to see, reaching its highest point in the sky during daytime and being no higher than 19° above the horizon at dusk. By the end of the month, it is more difficult to see, being very close to the Sun, at a separation of only 12° from it.

NEPTUNE: Recently passed behind the Sun at solar conjunction. It begins the month extremely difficult to see, being very close to the Sun, at a separation of only 13° from it. By the end of the month, it remains very difficult to see, reaching its highest point in the sky during daytime and being 5° below the horizon at dawn.

MOON PHASES:

Last Quarter	2 April
New Moon	8 April
First Quarter	15 April
Full Moon	24 April
Last Quarter	1 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*

April

2 The Sombrero Galaxy is well placed

3 Conjunction of Venus and Neptune

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

6 Close approach of the Moon and Mars
Close approach of the Moon and Saturn
Lunar occultation of Saturn
The Moon at perihelion

7 Close approach of the Moon and Venus
Lunar occultation of Venus
The Moon at perigee

8 Asteroid 532 Herculina at opposition

10 Close approach of Saturn and Mars
Conjunction of the Moon and Jupiter

11 Close approach of the Moon and M45
Mercury at inferior solar conjunction

13 Lunar occultation of Beta Tauri

14 Centaurus A is well placed
Omega Centauri is well placed
136199 Eris at solar conjunction

15 The Whirlpool Galaxy is well placed

16 Messier 83 is well placed

18 Messier 3 is well placed

20 The Moon at apogee
Conjunction of Jupiter and Uranus

21 136108 Haumea at opposition
Comet 12P/Pons-Brooks reaches peak brightness
Comet 12P/Pons-Brooks passes perihelion

22 Lyrid meteor shower 2024

23 Messier 101 is well placed
π-Puppid meteor shower 2024

26 The Moon at aphelion
Lunar occultation of Antares

29 Close approach of Mars and Neptune

30 Mercury at aphelion

May

4 Close approach of the Moon and Saturn
Lunar occultation of Saturn
Close approach of the Moon and Neptune
Lunar occultation of Neptune

5 Close approach of the Moon and Mars
Lunar occultation of Mars
η-Aquariid meteor shower 2024

6 Conjunction of the Moon and Mercury

8 η-Lyrid meteor shower 2024

9 Mercury at greatest elongation west

10 Lunar occultation of Beta Tauri

12 Messier 5 is well placed

13 Uranus at solar conjunction

14 Conjunction of Mercury and Eris

15 Mercury at dichotomy

17 Asteroid 2 Pallas at opposition
Comet 46P/Wirtanen passes perihelion

18 Jupiter at solar conjunction

19 Mercury at highest altitude in morning sky

24 Lunar occultation of Antares

29 Messier 4 is well placed

31 Conjunction of Mercury and Uranus
Close approach of the Moon and Saturn
Lunar occultation of Saturn

Collected Observations (and thoughts) – Gary Walker

More on Odysseus – Posted 29 Feb

News has just come in of Odysseus sending back some lunar images from the surface of the Moon. Data has been difficult to access due to the lander's awkward landing,

resulting in the solar batteries not pointing in the optimum direction to receive sunlight. The less than perfect landing was down to human error!

The intention now is to put Odysseus to sleep to get through the lunar night and reawaken it afterwards.

Solar Observations - Posted 29 Feb

In January and, particularly, February, the weather has again been very cloudy! In January I observed the Sun on 18 days, whilst in February, I only managed 13 days. There was a big gap between 1st and 10th February when no observations were possible. In fact, the number of solar Observations in February was as bad as it was last December!

Admittedly, the Sun was visible on a few other days, but either only visible as brief "flashes" of Sun, or else it was only shining very weakly through clouds, so that observations were pointless!

However, in late February, there was a huge sunspot, with multiple umbrae and a large penumbra, crossing the Sun.

My observation of Comet 12P/ Pons–Brooks – Posted 1 Mar

Early this evening, I saw the new comet 12P/ Pons-Brooks through my telescope!

It had been a frustratingly long wait to see it, as a combination of the Moon interfering in the last week, and the recent terrible weather, made observation impossible! Even tonight, it was frustrating at first, as the sky kept on clearing, and then clouding over again. By the time I had got my telescope set up, it had typically clouded over again!

However, rather than switching off the GOTO, I left the telescope on in "sleep mode" to save the batteries. Finally, the sky did clear in time to see the comet.

Through my 8"SCT, at 62X and 100X, the comet was easy to see, appearing as a bright fuzzball, with a central bright spot. To my surprise, I could also see a faint tail, when I moved the telescope back and forth! Moving telescopes in this manner can make faint objects appear much more obvious. The tail seemed to be at least half a degree in length. The comet was fairly low in the NW sky, at around 7.45pm.

On websites, such as "Space Weather News" there were many spectacular images of this comet, showing a typical green coma and a long, narrow, tail. Of course, as usual, I couldn't see this colour through my telescope, because the comet is not bright enough to excite the colour rods in my eyes, whereas images can be built up over a long time, making the colours stand out!

This is the 45th comet that I have seen. It is, however, not a newly discovered one, as it was first found in 1815, and has a similar period to Halley's Comet, with a period of 71 years.

The magnitude of this comet had been stated to be about 6.5, meaning that it was quite "bright" for an average comet (normally, they are much fainter).

More on the Comet – Posted 3 Mar

Today, I compared the Comet with the galaxy M31, and I found that they appeared to be about the same magnitude - and angular size, too - (at least, of the Coma!). M31 is about magnitude 3.4, which suggests the Comet may be brighter than previously stated.

On the Subject of Comets! – Posted 10 Mar

After attending. the excellent talk by Nick James, I was reminded of some of the Great Comets that I have seen.

The first really spectacular comet was one that Nick featured in the talk, namely Comet Hyakutake, which I saw in March 1996, now 28 long years ago. This Comet was blindingly obvious to the naked eye, and it was one of the very rare times that you could just look in the general direction of where the comet was, and immediately find it.

This comet, apart from its large and bright coma, had a very long tail, also easily visible with the naked eye. It just looked like the classic illustrations that we are all familiar with, from the last few centuries!

Nick failed to mention the next Great Comet, Hale - Bopp, which came a year later in 1997, also with a coma and tail easily visible with the naked eye!

I also managed to see Comet McNaught in January 2007, on two evenings, despite it being wintertime, and the comet being low in the West. It was visible in twilight with the naked eye as a tiny speck but was clearly visible in binoculars as a ball like, dull yellowish coma of about the same angular size as Venus. The tail was about one degree in length.

Comet Holmes in 2007/2008 was about the weirdest comet that I have ever seen. In my telescope, it strongly resembled a jellyfish, as it consisted of a large sphere, with a "False Nucleus" inside it. This comet was easily visible with the naked eye, in Perseus.

And, of course, the most recent one, was Comet NEOWISE in 2020. The ancient people, would, no doubt, have considered this as heralding the Covid Pandemic, if it had occurred a few centuries ago!

There have been a few other good Comets that I have seen over the years but, of course, the first ones, even including the famous Halley's Comet, were disappointing!

Finally, not to forget Comet Kohoutek in 1973/1974, which was hyped up by the media to be as bright as the Moon but, in the end, it just basically ran out of steam, as Nick mentioned in his talk. Some other Comets have also done this!

I was glad to hear Nick quote David Levy in saying that "Comets are like cats in that they do exactly what they like, and they both have tails"! Unlike astronomical events like those involving the planets, the Moon, and eclipses, which can be predicted to the exact time of their occurrences, centuries ahead, and will “do exactly what is said on the tin", this is definitely not the case with Comets!

Many comets, especially first-time visitors from the Oort Cloud, like Comet Kohoutek was, just run out of steam too early, whilst others may flare up, unexpectedly, as in the case of Comet Holmes. Others move too close to the Sun and meet with a Nasty Accident! Comet ISON in 2013, was one of these.

The timing of this talk was obviously great, with the Comet Ponns-Brooks being in the sky at the present time!

SpaceX Starship Rocket – Posted 14 Mar

As I have remarked before, it is very rare that a Space related story makes the Top Story of the News, but it did again today, on the 6pm BBC News with the launch of the SpaceX Starship Rocket. Usually, these stories are relegated to the "and finally” bit at the end of the News!

This rocket launched successfully and, unlike its two predecessors, didn’t blow up - at least not until re-entry! Fortunately, again, it was unmanned.

The bad weather continues – Posted 14 Mar

The bad weather continues - there has not been a clear night since 6 March, over a week ago!

Even the Sun has not been visible for the last 5 days and, when I saw it today, to my surprise, in a period of Solar Maximum, I found that it was entirely devoid of sunspots!

Even last night, when the heavy cloud DID clear, it was inevitably still overcast with cirrus cloud! Only the Moon and Jupiter (in a close conjunction) were visible, plus some of the brighter stars, but the comet was invisible in my telescope!

Often, annoyingly, the sky has sometimes cleared later in the night, but there is only a narrow window in which to see the comet, in the early evening, before it sets!

SpaceX Starship Rocket (Part 2) – Posted 15 Mar

This rocket is about 400 feet tall, which makes it bigger than the Saturn V Apollo rockets! It has been designed to fly astronauts to the Moon and, at a later stage, to Mars.

Comet Pons-Brooks – Posted 15 Mar

After not being able to see the comet for over a week, since 6 March, I finally managed to see it today, which was 9 nights later!

As on 3 March, I saw that the comet was significantly brighter than the galaxy, M31, which it was still not far from. I was able to observe the comet, despite a fat crescent Moon, high up in the sky! Even so, there were still annoying patchy clouds drifting intermittently across the sky.

In fact, I was lucky to see the comet tonight, as the sky cleared in time, and stayed clear for long enough to observe it, before the sky clouded over again! The rest of the evening was mostly overcast.

Again, through my telescope, the Coma was showing a strong central condensation, with a central fuzzy ball, surrounded by a larger sphere of fuzz. I estimated that the Degree of Condensation was approximately 3-4.

The tail was still faintly visible, especially when I moved my telescope from side to side (another technique similar to the "averted vision" technique to make seeing of faint objects much easier). I was, however, still unable to see it with my 11 X 80 binoculars.

The Agony and the Ecstasy: The frustrations of being an amateur Astronomer! – Posted 22 Mar

Well, the weather has continued to be awful in March, with virtually every night being overcast, or nearly so! For example, after seeing the comet on 15 March, I had to wait a week, until today before I could see it again.

If the sky wasn't overcast with thick cloud, there was invariably extensive cirrus cloud across the sky, which is often even more irritating!

On the evening of 21 March, the clouds were patchy, with a few small breaks, but these were useless for observing. Although it was relatively clear to the North, the sky to the South remained cloudy. For GOTO observation, to be able to align the telescope in the first place, it is, of course, necessary to be able to see stars. These were clouded-out, so even if the area where the comet was situated was clear, it would still be useless and, in any case, even though the sky was fairly clear to the West, more cloud kept on coming up, so in the end, I had to give it up as a bad job!

Even on the 22nd, at first, there were still nuisance clouds hanging about, moving very slowly, and again, when I was aligning the telescope, the first alignment star of Sirius, which had been visible, disappeared again, so I had to choose another star! There was even a bit of light rain falling from this cloud although, fortunately, it was short lived.

Eventually, however, the clouds did melt away, and I managed to see the comet for the first time in a week. It was easy to see in my telescope, even in the twilight persisting in the West and, despite a Full Moon, which was fortunately well away from the comet in the East. I found that the comet was much brighter than M31.

I also managed to glimpse it with my 11X 80 binoculars, but it wasn't easy, and the Coma only had a small angular size.

I also managed to see Mercury for the first time in this Spring apparition. It was already easily visible with the naked eye, and low down. In my telescope, it only appeared as a shapeless “blob” due to its low altitude. In any case, it only presented an angular size of 7' arcseconds, so it appeared small, even at 222X.

Yet more on Comet Pons Brooks – Posted 23 Mar

This comet is known in the media as the "Devil Comet" due to its occasional horned appearance. Personally, I haven't actually seen this effect, but I expect it is really only visible on images of it.

This comet has a 71-year orbit, which is similar to Halley's Comet (76 years). It last passed by in 1954 and will next pass us in 2095.

Our survey of the sky is uncovering the secrets of how planets are born

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When we look out to the stars, it is typically not a yearning for the distant depths of outer space that drives us. When we are looking out there, we are truly looking back at ourselves. We try to understand our place in the unimaginable vastness of the universe.

One of the most burning questions that drives us is how unique we are. Did life only emerge here on Earth or is our galaxy teaming with it?

The very first step in finding out is to understand how special the Earth really is – and, by extension, our entire Solar System. This requires knowledge about how solar systems actually form. And that's exactly what my colleagues and I have started to uncover with a new series of studies of star-forming regions.

In the past decades, astronomers have spotted more than 5,000 planets around distant stars – so called exoplanets. We now know that planets are so abundant that you can look up to almost any star in the night sky and be near certain that planets are circling around it. But what do these planets look like?

The first planet that was discovered around a star similar to the Sun, came as a shock to us. It was a so-called hot Jupiter, a massive gas giant that orbits its parent star on such a tight orbit that the length of a year is only four days. This is a truly alien world with no equal in our own solar system.

From this first ground-breaking discovery, astronomers have gone on and found tightly packed systems of super-Earths, rocky planets several times as massive as the Earth, as well as awesome gas giants in century-long orbits around their parent star. Of the many planetary systems that we have found, none equals our own solar system. In fact, most of them are quite different.

To understand how all of these different systems come to be, we have to turn to the very beginning. And that's majestic discs of dust and gas that surround the youngest stars. These are the nurseries which will eventually bring forth new planetary systems.

These discs are enormous objects, up to several hundred times as extended as the distance between the Earth and the Sun. Yet in the sky they appear tiny. This is because even the nearest ones, which are practically in our galactic backyard, are between 600 and 1,600 light years away.

That is a tiny distance when you consider that the Milky Way galaxy has a diameter of more than 100,000 light years, but it still means that light, the fastest thing in the universe, takes up to 1,600 years to reach us from there.

The typical size of one of these planetary nurseries, as seen from the Earth, would be an angle of 1 "arc-second" on sky, which is equivalent to a 3,600th part of a degree. To put it in perspective, it is like trying to observe a person standing on top of the Eiffel Tower from 500km away in the Dutch capital of Amsterdam.

To observe these discs, we need the most advanced and largest telescopes. And we need sophisticated instruments that can correct for atmospheric turbulence which blurs our images. This is no mean feat of engineering, with the latest generation of instruments only being available since about a decade.

New findings

Using the European Southern Observatory's "Very Large Telescope", the VLT, and the Sphere extreme adaptive optics camera, we have now started to survey nearby young stars.

Our team, consisting of scientists from more than ten countries was able to observe more than 80 of these young stars in amazing detail – with our findings published in a series of papers in the journal Astronomy and Astrophysics.

All the images were taken in near infrared light, invisible to the human eye. They show the light from the distant young stars as it is reflected from the tiny dust particles in the discs. This dust is much like sand on the beach and will eventually clump together to form new planets.

What we found was an astonishing diversity of shape and form of these planetary nurseries. Some of them have huge ring systems, others large spiral arms. Some of them are smooth and calm, and yet others are caught in the middle of a storm as dust and gas from the surrounding star-forming clouds rains down on them.

While we expected some of this diversity, our survey shows for the first time that this holds true even within the same star-forming regions. So even planetary systems that form within the same neighbourhood might look quite different from one another.

Finding such a wide range of discs suggests that the huge diversity in exoplanets discovered so far is a consequence of this broad spectrum of planetary nurseries.

Unlike the Sun, most stars in our galaxy have companions, with two or more stars orbiting a shared centre of mass. When looking at the constellation of Orion, we found that stars in groups of two or more were less likely to have large planet-forming discs than lone stars. This is a useful thing to know when hunting for exo-planets.

Another interesting finding was how uneven the discs in this region were, suggesting they may host massive planets that warp the discs.

The next step in our research will be to connect specific planets to their nurseries, to understand how the different systems might have formed in detail. We also want to zoom in even closer in the innermost regions of these discs in which terrestrial planets like our own Earth might already be forming.

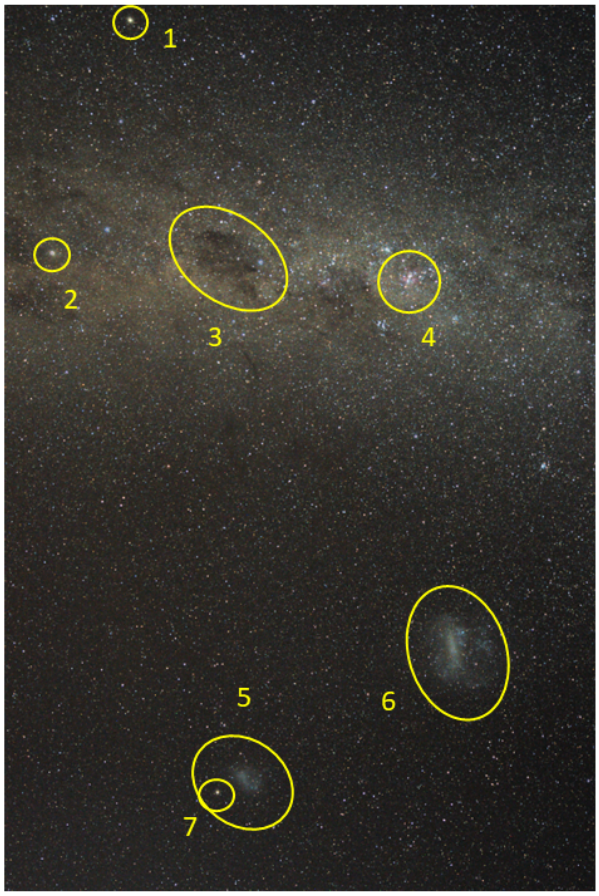
For this, we will use the next generation of telescopes spearheaded by the "Extremely Large Telescope" of the European Southern Observatory that is right now under construction in the Chilean Atacama Desert.

There are many questions to answer. But thanks to our survey we now know that the very first step on the long way for life to emerge is an utterly beautiful one.

Object of the month – Martin Howe - Postcard from New Zealand

This month's "object of the month" has again been provided by Martin Howe in the form of a Postcard from New Zealand, where he is still on holiday!

To: The Ewell Astronomical Society



Welcome to another "postcard" from New Zealand! One of the beauties of visiting the southern hemisphere is the range of different celestial objects that that are not visible from the northern latitudes of the UK. This month's postcard is a wide field image that highlights some of the brighter stand-out objects that the southern hemisphere has to offer.

The first of these objects is the globular cluster, omega Centauri (1) which was featured in last month's "postcard". As noted in that issue, this is the brightest globular cluster in the skies, clearly visible to the naked eye, at magnitude 3.9.

The second object on the list, (2), is alpha Centauri. This is not a single star but in fact a triple star system. There are two close companions, A and B, which shine with a combined magnitude of zero, making it the 4th brightest star in the sky. However, the third member of this triple star system is Proxima Centauri, slightly closer to us than the other pair, and is the closest star to our solar system. Proxima is a red dwarf star and shines at a very dim magnitude 11, but it is also host to two (known) exoplanets, making these the closest known exoplanets to our solar system.

To the right of alpha Centauri, (3), is the large dark patch of sky within the Milky Way that appears devoid of stars. This is not because of the absence of stars in this region, but is due to the presence of a 'dark nebula' – a region of gas and dust that is blocking our view of the stars behind.

Further to the right is the 4th object of note in the image – the eta Carinae nebula. This is the remnant of a supernova explosion in 1843, creating what was at the time the second brightest star in the sky. However, it appears as though the explosion did not destroy the star completely and the star is now one of the candidates for the next possible supernova from the relatively nearby region of our galaxy.

The 5th and 6th objects are the Small and Large Magellanic Clouds respectively. These are satellite galaxies of our Milky Way at about 200,000 and 160,000 light years away from us respectively, making them the most distant objects visible to the unaided eye after the Andromeda galaxy.

The final object in this list is the globular cluster 47 Tucanae. With an apparent magnitude of 4.1, this makes 47 Tucanae the second brightest globular cluster (behind omega Centauri) in the night sky. Although it appears close to the Small Magenllanic Cloud (SMC), this is just a line-of-sight proximity, it is in fact over 10 times closer than the SMC.

The image above has been cropped from a composite of five 15-second exposures at ISO 1600 with a Canon 5Dmk111 DSLR and 14mm lens.

Important Note:

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.

Up Next:

NEXT MEETING: 8pm Friday 12 April – Nonsuch High School

Professor 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 session, allowing for moon rise & set times and cloud conditions, should be sometime around the new moon which is on 8 April.

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 1-12 April.

AD HOC OBSERVING AT WARREN FARM:

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