



June 2022 EDITION

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Editorial

Welcome to the June edition of Janus. Our speaker this month is Colin Stuart, who will be talking about "The Rebel Star (Great Mysteries of the Sun)". Once again, the meeting will be a "hybrid" one with the option to attend either in person or via Zoom. We intend to maintain this format for as long as is justified by a reasonable number of Zoom attendees. Hopefully though, we can eventually return to the pre-Covid situation of everyone attending in person and enjoying ad-hoc discussions.

Mid-May saw the release of the image of the Black Hole at the centre of our galaxy. Needless to say, it attracted a great deal of attention in both the popular and scientific press, and I have taken the liberty of reproducing an article by Derek Ward-Thompson, Professor of Astrophysics at the University of Central Lancashire, who led a team from the University which was part of the large international team of astronomers responsible for the first image of the object.

JWST is now entering the final stages of commissioning. With the telescope optics and instruments aligned, the Webb team is now commissioning the observatory's four powerful science instruments. There are 17 different instrument "modes" to check out on the way to getting ready for the start of science this summer which are described in a post on the JWST site (<https://blogs.nasa.gov/webb/2022/05/12/seventeen-modes-to-discovery-webbs-final-commissioning-activities/>). Once all 17 modes have been approved, JWST will finally be ready to begin scientific operations! For all the latest information on JWST go NASA's JWST site: <https://www.jwst.nasa.gov/>

John



The Solar System June

MERCURY: recently passed in front of the Sun at inferior solar conjunction. It begins the month not readily observable since it is very close to the Sun, at a separation of only 14° from it. By the end of the month, it may be just about visible as a morning object, now well past greatest elongation west and returning closer to the Sun. It will reach its highest point in the sky during daytime and be no higher than 2° above the horizon at dawn, making observation challenging.

VENUS: remains just about visible as a morning object, now well past greatest elongation W and returning closer to the Sun. Beginning the month rising at 03:32 BST, it will be difficult to observe as sunrise is only just over an hour later by which time it will be no higher than 6° above the horizon at dawn. By the end of the month, it is visible in the dawn sky, rising at 03:02 - 1 hour and 42 minutes before the Sun - and reaching an altitude of 9° above the E horizon before fading from view as dawn breaks around 04:16.

MARS: is currently emerging from behind the Sun and, as the month progress, will become easier to see. It begins the month difficult to see, reaching its highest point in the sky during daytime and being no higher than 10° above the horizon at dawn. By the end of the month, it is visible in the dawn sky, rising at 01:24 BST - 3 hours and 20 minutes before the Sun - and reaching an altitude of 21° above the E horizon before fading from view as dawn breaks around 03:47.

JUPITER: is also currently emerging from behind the Sun. It begins the month visible in the dawn sky, rising at 02:34 BST - 2 hours and 14 minutes before the Sun - and reaching an altitude of 15° above the E horizon before fading from view as dawn breaks around 04:21. By the end of the month it is visible for longer, rising at 00:47 BST - 3 hours and 57 minutes before the Sun - and reaching an altitude of 29° above the

SE horizon before fading from view as dawn breaks around 04:16.

SATURN: is currently emerging from behind the Sun. It begins the month visible in the dawn sky, rising at 01:26 BST - 3 hours and 22 minutes before the Sun - and reaching an altitude of 17° above the SE horizon before fading from view as dawn breaks around 03:53. By the end of the month, like Jupiter, it is visible for longer, rising at 23:32 BST and reaching an altitude of 23° above the S horizon before fading from view as dawn breaks around 03:48.

URANUS: recently passed behind the Sun at solar conjunction. It begins the month extremely difficult to see, reaching its highest point in the sky during daytime and being 9° 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 is no higher than 3° above the horizon at dawn.

NEPTUNE: is currently emerging from behind the Sun and begins the month very difficult to see as it will reach its highest point in the sky during daytime and be no higher than 2° above 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 no higher than 17° above the horizon at dawn.

MOON PHASES:

New Moon	30 May
First Quarter	7 Jun
Full Moon	14 Jun
Last Quarter	21 Jun
New Moon	29 Jun

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>

June

- 2 M13 is well placed
- 3 M12 is well placed
- 4 Saturn enters retrograde motion
- 6 M10 is well placed
- 10 Daytime Arietid meteor shower 2022
- 11 M92 is well placed
- 16 Mercury at greatest elongation west

- 18 Conjunction of the Moon and Saturn
Close approach of the Moon and Saturn
IC4665 is well placed
- 21 June solstice
Conjunction of the Moon and Jupiter
Close approach of the Moon and Jupiter
- 22 Mercury at dichotomy
Conjunction of the Moon and Mars
Close approach of the Moon and Mars
Lunar occultation of Mars
- 23 NGC 6530 is well placed
- 24 Close approach of the Moon and Uranus
Lunar occultation of Uranus
- 26 Mercury at highest altitude in morning sky
Close approach of the Moon and Venus
Conjunction of the Moon and Venus
- 27 June Bootid meteor shower 2022
- 28 Neptune enters retrograde motion
- 29 NGC 6633 is well placed

Collected Observations (and thoughts) – Gary Walker

Mercury – 8 May

I have been observing Mercury from 19th April into early May.

On the evening of 8th May, I distinctly saw Mercury as a narrow crescent 🌙. I have only very rarely seen Mercury in this phase, as, when past its maximum altitude in this cycle, it soon becomes lower and lower in the sky. As well as that, it soon fades, as the phase of Mercury shrinks.

On this day, it was still magnitude 1.8, having faded from - 0.7, back on 19th April. It was a beautiful clear, cloudless evening with, for once, no pesky cirrus clouds!

That is another reason why Mercury is so elusive - not only does it move rapidly, being the closest planet to the Sun, its magnitude varies quite rapidly, during the short period when it is best visible.

On this day, Mercury was at 10.1' arcseconds in angular size, which is still small in a telescope, even at 222X, but it is about as "large" as Mercury ever gets!

In other news, the Sun continues to be extremely active in both white light and ha light. A big spot group has just crossed the

Sun and, in ha light, I saw numerous prominences, flares, and filaments. On 8th May, and earlier, I saw a number of quite long filaments.

The Black Hole at the Centre of our Galaxy – 13 May

Today, (13th May), I saw that EVERY national newspaper covered the story of the release of the image of the Black Hole at the centre of our galaxy!

Three years ago, the first ever image of such a black hole, was the one in the galaxy of M87, in the constellation of Virgo, which also received full coverage in all of the newspapers!

The story was also on the BBC News the previous evening, (inevitably, of course, near the end of the main news).

This black hole is "in" the constellation of Sagittarius, and is thus known as Sagittarius A*. Ironically, it was much harder to image than the one in M87, as for one thing, it was more obscured by dust, and it keeps on fluctuating, so making it harder to image.

I was not entirely surprised by the announcement of this one, as some news items on the Internet, earlier in the week, had hinted about a big announcement coming up on that day.

Lunar Eclipse – 16 May

I was up to see this Lunar Eclipse. (as I expect you all were, agog to see it), and I did manage to see, at least part of it!

The weather forecast had not been good, with expectations of thunderstorms and cloud cover, but after being wet and overcast the previous evening, the sky had actually partially cleared, and the Moon was visible.

Inevitably, a big cloud was slowly drifting from the South, which obscured the moon, but luckily it came back out again by around 3.45am. By then, the moon was about one third obscured.

It was very low in the SW by then, but I observed it for a little while from my back garden up to 4.03am, when it started to sink out of view behind my treeline. I used 10 X 50

binoculars and my 8" SCT scope to observe it.

During this time there was some lightning ⚡ and thunder off to the West, but fortunately, not coming my way! This made it all seem a bit sinister and eerie. It was also very warm, humid, and dead calm. Then, I had to do the trek over to the fields at the back of my house to see the rest of the eclipse.

I observed the rest from around 4.18 - 4.26am. By 4.18am, the Moon was just a narrow crescent, and, with binoculars, I could see the eclipsed side, which was starting to take on a reddish tinge.

I last saw the Moon at 4.26 am, which would have been just before the start of Totality. The "crescent" was shortening by then, but it sank into a band of cloud and I did not see it again.

In a Lunar Eclipse, the "phases" of the moon never look quite "right" but rather, "weird". When it had gone down to a narrow crescent, it appeared much straighter, and narrower than a normal crescent moon would be.

So, I can count this eclipse as a success, as at least I got to see some of it (in many eclipses, I have been totally clouded out!).

Of course, even in perfect weather, I was never going to see all this eclipse, as it was starting to set. The Umbral, or partial, phase started at 3.29 am, and totality at 4.29 am, but Moonset occurred at 5.10 am. Also, it was getting light so, even in ideal conditions, the totally eclipsed moon would be difficult to see.

Thus, I, and others could only see the umbral or partial phase well, and the earlier part of totality, at best! I managed to see the eclipse from about 3.45am to about 4.26 am, a period of about 41 minutes in all.

I had not had much hope beforehand in being able to see it, as the weather forecasts gave the impression that it would probably be totally overcast, so it just shows how primitive the weather news reports are. One can never really know beforehand how cloudy, or clear, it will actually be, at the time!

Clanfield Observatory Again! – 23 May

In the programme "Secrets of Size: Atoms to Supergalaxies", shown on BBC4 on 23rd May, about the galaxies and the scale of vast galaxy clusters in the Universe, part of the programme was filmed at Clanfield Observatory, run by the Hampshire Astronomical Group. One dome and the bright green Clubhouse were clearly seen. The programme further showed that one telescope there had obtained a spectrum of the Andromeda Galaxy (M31), to demonstrate that the spectrum shows that it is blue - shifted, meaning that it is moving head - on towards our Galaxy!

I have seen this Observatory featured occasionally in other astronomical programmes, too. Our Society visited it in 2017.

Latest on the Sun – 25 May

Well, the Sunspots just keep on coming and coming and coming! Towards the end of May, a large complex of spots crossed the Sun, surrounded by a large penumbra. This penumbra resembled the view of an Amoeba through a microscope.

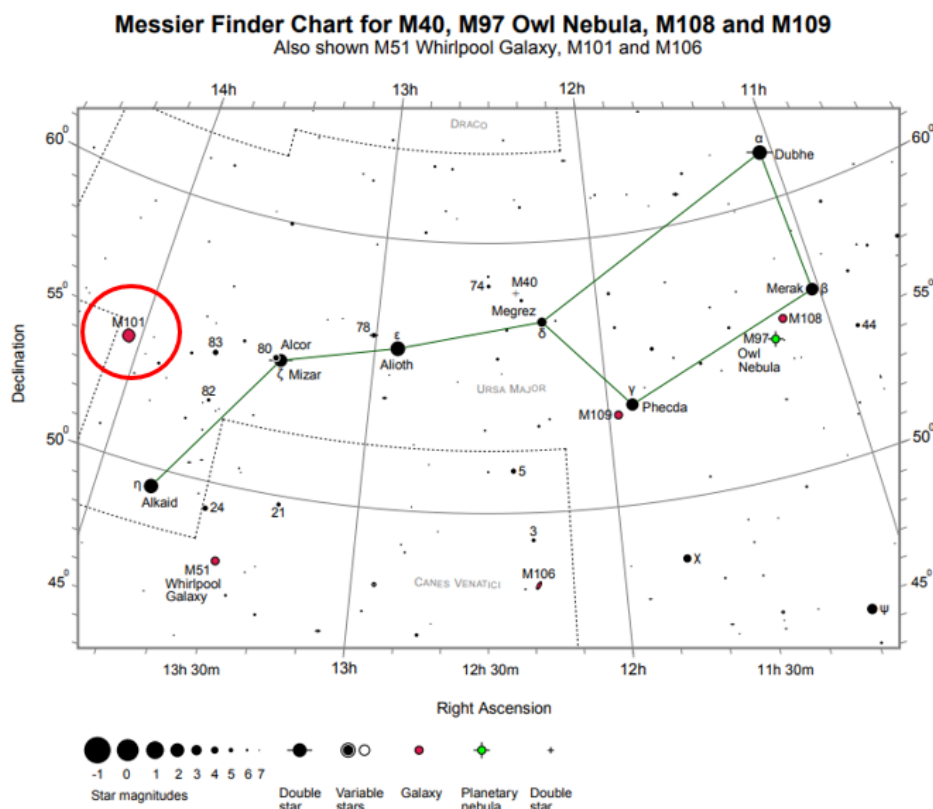
Not too long ago, the Sun had been so inactive, that if you saw a sunspot upon it, that sunspot was barely visible even in a telescope, and it was a Notable Event. Now, we are spoilt for choice!

And, of course, the view in Ha light has been good as well (although, of course, Ha light events are always going to be more numerous than white light events, as most of these phenomena are invisible in white light).

Object of the month – The Pinwheel Galaxy (M101) - Martin Howe

June is a bit of a lean month from a deep sky observing perspective as it coincides with the summer solstice, and consequently for the whole of June the night sky does not get truly dark (when the Sun dips beyond 18° below the horizon).

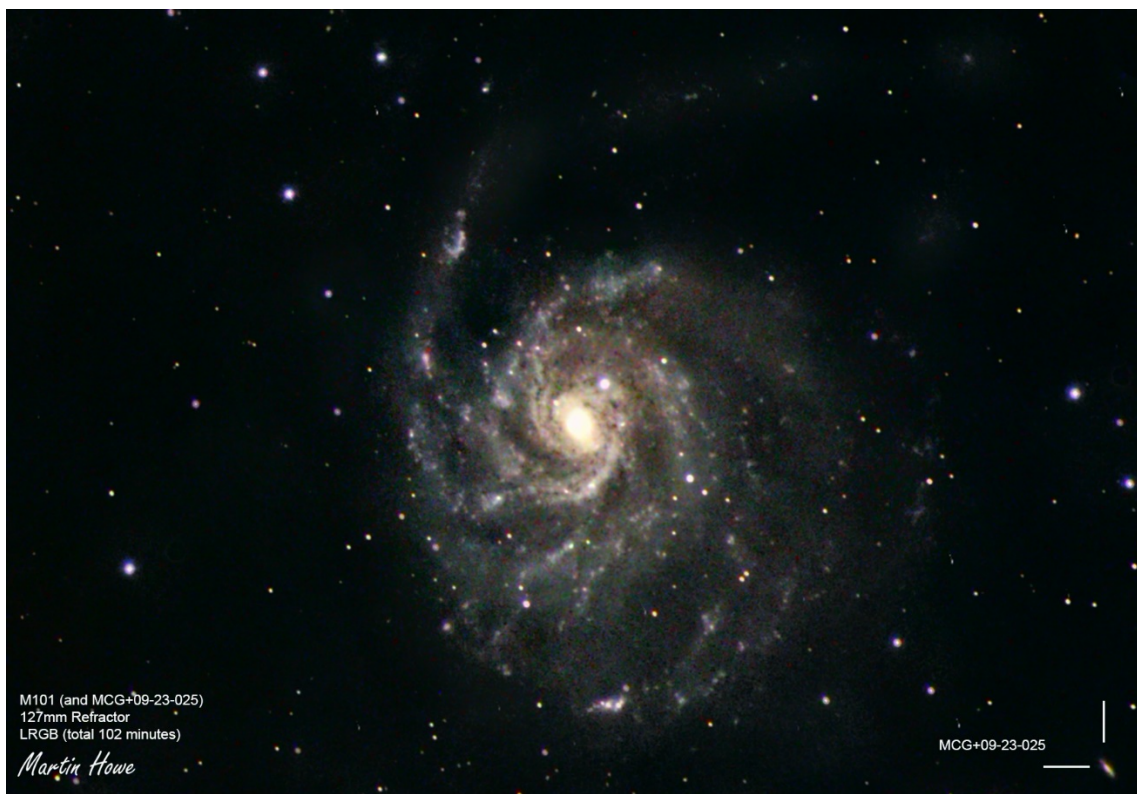
Although Ursa Major is now past its highest and dipping to the west, the great spiral galaxy M101 can still be spotted, given its position at the tail end of the constellation. It should be relatively easy to find as it makes a fairly neat equilateral triangle with the last two stars in the handle of the "plough" - Alkaid and the wide double star Alcor/Mizar. (See the finder chart below, courtesy of freestarcharts.com).



At a catalogued magnitude of 7.9 it should be within reach of a pair of binoculars, but as with all extended objects the actual brightness can be much lower than this, and so not as easy to see as the listed magnitude might imply. Suffice it to say, to improve your chances of seeing it, find a location away from light pollution and choose a moonless night.

Discovered in 1781, M101 is about 25 million light years away, so 10 times further away and slightly smaller than our nearest large galactic neighbour the Andromeda galaxy. It is estimated to contain about 1 trillion stars!

The image below was taken with a 127mm refractor and a mono CCD camera. Separate images were taken using red, green, blue and luminance filters and then combined to create a colour image. This image was captured over the course of one evening, but given the limited darkness time available only comprised of a total exposure of about 100 minutes. Also marked in the bottom right of the image is a small background galaxy, catalogued as MCG+09-23-025. There appears to be little information available about this object other than it is about magnitude 15 and is a Seyfert type II galaxy (one reference suggested that it might be about 90 million light years away). Seyferts are galaxies with an extremely active galactic nucleus (AGN), with their high luminosity attributed to the presence of a very active supermassive black hole.



How we captured first image of the supermassive black hole at centre of the Milky Way

Acknowledgement: This article was written by Derek Ward-Thompson, Professor of Astrophysics, University of Central Lancashire, and was published in **THE CONVERSATION** on 12th May. It is republished in full under Creative Commons Licence. The original article, with additional links can be found here: <https://theconversation.com/how-we-captured-first-image-of-the-supermassive-black-hole-at-centre-of-the-milky-way-183010>

Black holes are among the most profound predictions of Einstein's theory of general relativity. Originally studied as a mere mathematical consequence of the theory rather than as physically relevant objects, they soon became thought of as generic and sometimes inevitable outcomes of the gravitational collapse that initially forms a galaxy.

In fact, most physicists have suspected that our own galaxy revolves around a supermassive black hole at its centre. There are other ideas too – such as “dark matter” (an invisible substance thought to make up most of the matter in the universe). But now an international team of astronomers, including a team that I led from the University of Central Lancashire, has unveiled the first image of the object lurking at the centre of the Milky Way – and it is a supermassive black hole.

This means there is now overwhelming evidence for the black hole, dubbed Sagittarius A*. While it might seem a little scary to be so close to such a beast, it is in fact some 26,000 light-years away, which is reassuringly far. In fact, because the black hole is so far away from Earth, it appears to us to have about the same size in the sky as a donut would have on the Moon. Sagittarius A* also seems rather inactive – it is not devouring a lot of matter from its surroundings.

Our team was part of the global Event Horizon Telescope (EHT) Collaboration, which has used observations from a worldwide network of eight radio telescopes on our planet – collectively forming a single, Earth-sized virtual telescope – to take the stunning image. The breakthrough follows the collaboration's 2019 release of the first ever image of a black hole, called M87*, at the centre of the more distant Messier 87 galaxy.

Looking into darkness

The team observed Sagittarius A* on multiple nights, collecting data for many hours in a row, similar to using a long exposure time on a camera. Although we cannot see the black hole itself, because it is completely dark, glowing gas around it reveals a tell-tale signature: a dark central region (called a “shadow”) surrounded by a bright ring-like structure. The new view captures light bent by the powerful gravity of the black hole, which is four million times more massive than our Sun. The discovery also yields valuable clues about the workings of black holes, which are thought to reside at the centre of most galaxies.

The surprising thing about this image is that it looks so similar to the image of M87* we published three years ago – this certainly came as a surprise. The reason for the similarity is that while the M87* black hole is about 1,000 times bigger, the Sagittarius black hole is about 100 times closer. Both of them obey Einstein's theory of general relativity, showing Einstein was right for a factor of 1,000 in size scale. To a physicist this is important. Relativity has been around for a century and it is still proving to be accurate. I think even Einstein himself might have been surprised by that!

The publication of the picture of the Sagittarius A* black hole is a tremendously exciting achievement by the collaboration. When I first saw the image, I thought: this tells us a lot. I couldn't wait to start writing about it and interpreting the image. We had a lot of meetings to come to a consensus of what it tells us. To begin with we were meeting face to face in different parts of the

world. Then COVID struck and suddenly nobody could go anywhere. So online meetings became the norm, as in every other aspect of life. This definitely slowed us down.

My role was to help write two of the six papers that have been released in the Astrophysical Journal Letters: the first one, introducing the observation; and the third one, in which we discuss how we made a picture out of the observations, and how reliable that image is.

In addition, I was a “contributing author” for all six papers. This is an administrative role, in which I handled all correspondence between our team of over 300 astronomers and the academic journal that published our findings. This had its challenges, as I had to deal with every typo and every mistake in the typesetting.

I also had to channel comments from my colleagues. Since the majority of the collaborators are based in either the US or East Asia, it meant that they were working during the night in UK time. Hence, each morning I would come to work to find about 100 overnight emails from colleagues – a daunting start to any day.

Anyway, we got there in the end – and the dazzling result was worth all of the work.

Up Next:

NEXT MEETING: 8pm Friday 10 June 2022 - Nonsuch High School

Colin Stuart will give a talk on “The Rebel Star (Great Mysteries of the Sun)”.
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 and 29th June. 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.