JANUS
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

DECEMBER 2024

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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 December edition of Janus – the last one of 2024.

As noted last month, we have no lecture in December – instead, we have our AGM complete with Quiz, Raffle, Christmas Fare, and a chance to look forward to the coming year. Please come along and enjoy yourselves – the more the merrier! In addition to the necessary AGM business and the festivities, there will also be the customary presentation on the sky at night for the coming month.

As I promised last month, I have included in this edition a selection of members' images of Comet C/2023 A3 Tsuchinshan-ATLAS (now departed) and the Aurora which were taken in October. The images were extracted from WhatsApp messages, so the quality is variable, dependent upon how compressed the originals were when they were sent. Nevertheless, I hope you will appreciate them. Also, some members may be unaware that there's a gallery on the society's website with more images of Sun, Moon, Solar System, Deep Sky and Nightscapes.

I have yet to receive any response to my request for members' thoughts on potential changes/improvements/additions to Janus. If you're happy with things as they are, that's fine – if not, then please do let me know. As I said, I can't promise to accommodate everyone's ideas, but I'm open to any (reasonable) suggestions. Please email them to me at the editor's email address. Remember: It's your Newsletter, not mine!

Looking ahead to 2025, our next lecture on Friday 10 January will be given by Tim Parsons. The topic is "A massive star menagerie: touring among the upper reaches of the Hertzsprung-Russell diagram". If you've not come across this diagram before, you might want to explore it via Google – Martin Howe offers similar advice in his piece this month.

Finally, an apology. I am celebrating Christmas and New Year with family in Australia, so will be away for more than 3 weeks from mid-December. This means that I will not be able to compile a January edition of Janus. The first edition of 2025 will be in February.

John

skyUpdate
What's up this month?

The Solar System December

MERCURY: will soon pass in front of the Sun at inferior solar conjunction. It begins the month extremely difficult to see as it will reach its highest point in the sky during daytime and be 5° below the horizon at dusk. By the end of the month, just about visible as a morning object, it is now well past greatest elongation W and returning closer to the Sun. This makes it difficult to see, reaching its highest point in the sky during daytime and being no higher than 7° above the horizon at dawn.

VENUS: is emerging into the evening sky as it approaches greatest elongation E. At the beginning of the month, it will become visible at around 16:19 GMT, 12° above the S horizon, as dusk fades to darkness. It will then sink towards the horizon, setting 2 hours and 49 minutes after the Sun at 18:44. At the end of the month, it will become visible at around 16:26, 22° above the S horizon, as dusk fades to darkness. It will then sink towards the horizon, setting at 20:05.

MARS: is currently approaching opposition and is visible as a morning object. It begins the month becoming accessible around 21:02, when it reaches an altitude of 8° above the NE horizon. Reaching its highest point in the sky at 03:53, 59° above the S horizon, it will be lost to dawn twilight around 07:09, 41° above the W horizon. By the end of the month, it becomes accessible around 18:31, when it reaches an altitude of 7° above the NE horizon. It will then reach its highest point in the sky at 01:41, 62° above the S horizon, before being lost to dawn twilight around 07:38, 18° above the W horizon.

JUPITER: begins the month approaching opposition. Visible in the morning sky, it becomes accessible around 17:20, when it reaches an altitude of 7° above the NE horizon. It will then reach its highest point in the sky at 00:22, 60° above the S horizon, before being lost to dawn twilight around 07:17, 8° above the NW horizon. By the end of the month, having recently passed opposition, it is visible in the evening sky, becoming accessible around 16:26 GMT, 20° above the E horizon, as dusk fades to darkness. Reaching its highest point in the sky at 22:04, 60° above the S horizon, it will continue to be observable until around 05:04, when it sinks below 7° above the NW horizon.

SATURN: is currently an early evening object, now receding into evening twilight. Visible in the evening sky, it begins the month becoming accessible around 16:44 GMT, 26° above the SE horizon, as dusk fades to darkness. Reaching its highest point in the sky at 18:15, 29° above the S horizon, it will continue to be observable until around 22:11, when it sinks below 11° above the SW horizon. Visibility throughout the month is largely unchanged and, by the end of the month, it will become visible at around 16:54, 30° above the S horizon, before sinking towards the horizon and setting at 21:45.

URANUS: recently passed opposition. and begins the month becoming accessible at around 17:28, when it rises to an altitude of 21° above the E horizon. Reaching its highest point in the sky at 22:43, 57° above the S horizon, it will become inaccessible at around 03:59 when it sinks below 21° above the W horizon. By the end of the month, it is visible in the evening sky, becoming accessible around 17:31 GMT, 40° above the SE horizon, as dusk fades to darkness. It will then reach its highest point in the sky at 20:41, 57° above the S horizon, and will continue to be observable until around 01:55, when it sinks below 21° above the W horizon.

NEPTUNE: is currently an early evening object, now receding into evening twilight. It begins the month becoming accessible around 17:23 GMT, 31° above the SE horizon, as dusk fades to darkness. Reaching its highest point in the sky at 19:06, 36° above the S horizon, it will continue to be observable until around 22:23, when it sinks below 21° above the SW horizon. By the end of the month, still an early evening object receding into evening twilight, it will become visible at around 17:31 GMT, 36° above the S horizon, before sinking towards the horizon, and setting at 23:00.

Notable Events:

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

December

1 New Moon

2 Pheonicid meteor shower 2024
The Moon at perihelion

4 Close approach of the Moon and Venus

5 Conjunction of Ceres and Pluto
December φ-Cassiopeid meteor shower 2024

6 Mercury at inferior solar conjunction
Jupiter at perigee
Mercury at perihelion
Puppid-Velid meteor shower 2024
Mars enters retrograde motion

7 Conjunction of Venus and Pluto
Jupiter at opposition
Neptune ends retrograde motion

8 First Quarter Moon
Close approach of the Moon and Saturn
Lunar occultation of Saturn
Conjunction of Venus and Ceres
Monocerotid meteor shower 2024

11 σ-Hydrid meteor shower 2024

12 Moon at perigee
Large Magellanic Cloud is well placed

13 Close approach of the Moon and M45

14 Geminid meteor shower 2024
Moon at aphelion
Close approach of the Moon and Jupiter
Asteroid 15 Eunomia at opposition
Running Man cluster is well placed
Orion Nebula is well placed

15 Full Moon
Lunar occultation of Beta Tauri
Comae Berenicid meteor shower 2024

18 Close approach of the Moon and Mars
Lunar occultation of Mars

19 December Leonis Minorid meteor shower 2024

20 Mercury at dichotomy
Mercury at highest altitude in morning sky

21 December solstice

22 Third Quarter Moon
Ursid meteor shower 2024

24 Moon at apogee
Lunar occultation of Spica

25 Mercury at greatest elongation west

28 Lunar occultation of Antares
Cluster NGC 2232 is well placed

29 Conjunction of the Moon and Mercury
The Rosette Nebula is well placed

30 New Moon
Moon at perihelion

January

1 Cluster Messier 41 is well placed

3 Asteroid 14 Irene at opposition
Quadrantid meteor shower 2025
Close approach of the Moon and Venus

4 Earth at perihelion
Close approach of the Moon and Saturn
Lunar occultation of Saturn

5 Lunar occultation of Neptune

6 Moon at First Quarter

8 Moon at perigee

10 Close approach of the Moon and M45
Venus at greatest elongation east
Close approach of the Moon and Jupiter

11 Lunar occultation of Beta Tauri

12 Venus at dichotomy
Mars at perigee

13 Asteroid 887 Alinda at opposition
Comet C/2024 G3 (ATLAS) passes perigee
Comet C/2024 G3 (ATLAS) passes perihelion
Full Moon

14 Close approach of the Moon and Mars
Lunar occultation of Mars
The Moon at aphelion
Cluster Messier 47 is well placed
NGC 2403 is well placed

16 Mars at opposition
Cluster NGC 2451 is well placed

18 Close approach of Venus and Saturn

19 γ-Ursae Minorid meteor shower 2025
Mercury at aphelion

20 Conjunction of Venus and Saturn
The cluster NGC 2516 is well placed

21 Lunar occultation of Spica
Moon at apogee
134340 Pluto at solar conjunction
Moon at Last Quarter

23 Cluster NGC 2547 is well placed

25 Lunar occultation of Antares

28 Moon at perihelion

29 New Moon

30 Uranus ends retrograde motion
Beehive cluster is well placed
Omicron Velorum cluster is well placed

31 Cluster IC 2395 is well placed

Collected Observations (and thoughts) – Gary Walker

Endless Cloudy Skies – Posted 4-10 November

It will be obvious to all members of the Society that the weather from late October into November has not been conducive for observing!

The UK has been under a high-pressure system throughout this time. It is ironic that, at this time of year, these anticyclones, rather than producing clear skies, as they do in the Summer, now usually fill the sky with clouds!

As there is no wind, the weather is just "stagnant", with endless dull days and nights of overcast skies, with nothing to break up the infernal clouds.

The weather was like this from about 28 October through to 3 November, and the Sun, if visible, only appeared in short flashes, which are useless for solar observations!

However, on 4 November, after a week, the clouds finally broke, and there was a fair amount of sun. In the early evening, despite extensive cirrus cloud, some stars were visible, and I managed to see the Comet, for the first time in a whole week.

The previous dreary pattern, however, soon returned such that, by 8 November, there had been 3 more days when there had been, literally, no Sun at all visible, never mind being observable! As well as the weather being almost endlessly overcast and dull by day and night, it was also dead calm. The BBC News Weather on 8 November said that the cloud cover was about 600-800 metres thick (i.e. about 1,800 - 2,400 feet)! It also said that in the previous 11 days, the area of Basingstoke had had only 18 minutes of sunshine. In our area, we may have had a bit more than that - 4 November was a mostly sunny day, albeit the only sunny day since 27 October!

I popped out late on the evening of 9 November and saw Jupiter shining brightly through a tiny break in the overcast. The break was, however, short lived, but it suggested that the cloud cover may have been thinner than the BBC had suggested.

Finally, in the early evening of 10 November, the clouds started to break up, and I had a look at Jupiter and Saturn. With Saturn, I could see that the rings were nearly edge on, but not quite, so I could still pick out the gap between the rings and the planet. I could also distinctly see the dark line where the rings were crossing the planet.

The skies had been overcast since 28 October, which was, by now 13 days ago (nearly 2 weeks!), the only exception being 4 November!

The New Patron of our Society! – Posted 19 November

At the November meeting, our new Patron, Professor Andrew Coates, was introduced to us. He works at the Mullard Space Science Laboratory, in Surrey - an establishment that is very familiar to all of us, with a number of Speakers over the years, coming from there, as well as two trips by the Society to the Laboratory. He, then, proceeded to give an excellent talk on the chances of life on Mars and the icy moons of the outer gas giants.

The Society has now had three Patrons. The first was the great Sir Patrick Moore, who was patron from the beginning in 1966 until his death at the end of 2012. He served the longest of the three Patrons, with a total of 46 years. Unfortunately, he was very rarely able to give talks to the Society and only gave one or two, in about 1967!

We then had Professor Ian Morison from January 2013, until 2024, when he, too, died, after serving for over 11 years.

Now, our new Patron has taken up the post, in November 2024. How many years will he serve I wonder?

Unlike Sir Patrick Moore, both Professor Ian Morison and Professor Andrew Coates have occasionally given talks to the Society, in the past.

Some other notable people in the Astronomical world have also given talks including:

- Sun. Professor Lucie Green (Mullard Space Science Laboratory) specialising in the

- Michael Maunder, on Solar Eclipses (mainly meaning Total Eclipses!).
- Bob Mizon (Campaign for Dark Skies).
- Dr Michelle Dougherty (Imperial College) who is involved in Space missions such as the JUICE probe to Jupiter and the Cassini-Huygens mission to Saturn!
- Professor Monica Grady (Natural History Museum and Open University) on Meteorites.
- Heather Cooper, who was the first female president of the British Astronomical Association in 1984-1986, and Nigel Hemburst, her partner.
- Commander H. Hatfield R.N (the Sun).
- Neil Bone (Director of the BAA Meteor Section).
- Professor Jocelyn Bell Burnell who discovered the first Radio Pulsar, in 1967!
- Matt Taylor who was the Project Scientist of the Rosetta Mission to land on a comet nucleus.
- Owen Brazell, (BAA and the Webb Society). He presently has a monthly article, called Deep Sky Challenge "in the "Astronomy Now" magazine.
- Nik Szymanek who also has a monthly article in "Astronomy Now " magazine.

So, apart from just amateur astronomical lecturers, many others (some famous) have lectured to this Society over the years!

The Fading Comet – Posted 20 November

After finally getting rid of the clouds and the Moon, I observed the comet T-ATLAS again, yesterday and today.

Viewed with my telescope, it appeared as a fairly "bright " fuzzy ball. I thought that I could still see a very faint tail, when I moved the telescope, at 100X. There was, however, no sign of it in my binoculars. Clearly, it has faded significantly since its "Glory Days" (or rather, Nights!) of October, and has been listed on the astronomical site of "Night Sky Live" as now of magnitude 8.8. It remains, however, a respectably bright telescopic comet. After all, most comets don't even get as "bright" as this one is at present – at best, they are only of about this magnitude!

Life in our Solar System – Posted 20 November

Returning to the recent talk by Professor Andrew Coates on life in the Solar System, it is astonishing to discover that life could possibly exist in the Moons of Europa (of Jupiter) and Enceladus (of Saturn). For many years, the outer Solar System was thought to be just frozen and dead, where nothing ever happens. Now, probes have shown that water oceans exist beneath the crusts of both of them!

In the past, the only obvious planet thought to harbour life, was Mars (indeed, it is still thought that it does - or did so in the past)! Expectations have, however, shrunk from Martians, down to, at best, microbiological organisms!

Also, in the past, Venus was thought to harbour life, maybe as tropical jungles, or even Venusians! Later, probes revealed that conditions there were far more representative of Hell than of Paradise! However, only four years ago, phosphine was detected in the clouds of Venus, which MIGHT indicate the presence of Life! Even before this, it had been thought that the only place that life could exist on Venus would be in the clouds, because the temperature and pressure at a certain altitude in this cloud layer is far more similar to the Earth (if you excuse the sulphuric acid!)

Today, the planets have many more moons attributed to them than they used to (Saturn was thought, back then to have 10 moons, but now has at least 146 moons, and even that may not be the end!)

This new knowledge is down to advanced telescopes - notably the Hubble Space Telescope - but more especially, the space probes sent out across the Solar System. Certainly, the Solar System of the 21st Century is far more complicated and interesting, than it appeared to be in the 1970's and 1980's!

GOTO not working properly in this very cold weather! – posted 21 November

With typical irony, on getting a clear evening this evening, in the bitterly cold and frosty weather, the GOTO on my telescope refused to work properly. It powered up OK, but

when moving to the alignment stars, it just went around in a flat circle, refusing to rise up to point at the stars!

I had this problem once before, in December 2022, when the temperatures were freezing, so it is obviously down to the cold weather. On that occasion, I wrote to the "Scope Doctor" Steve Richards, in "The Sky at Night", magazine, and actually got my letter and his reply published in the April 2023 issue!

He said that, in cold weather, the viscosity of the lubricant in the gears and bearings increases, causing a greater load on the motor drive. If using batteries (as I do), the electrochemical reaction that produces the electrical current slows down, so reducing the power of the battery.

The last time this happened, I managed to shovel the telescope into my loggia, (which wasn't easy, I can tell you), the theory being that it would be slightly warmer in there, with the heat from the house, (or at least, less cold). This change of storage location worked, and my GOTO functioned normally on the following nights. Others might like to bear this in mind if they experience similar problems.

Incidentally, I could see Venus shining very brightly, very low down in the S - SW, just about on my "horizon". According to the" Night Sky Live" website, it was only about 5 degrees above the actual horizon, at this time - around 5:25pm.

Latest Observations – Posted 26 November

I saw Venus through my telescope at twilight last night. It appeared as a half phase, although it is actually about 69%. It is still very low in the Southern sky, so, consequently appeared multicoloured. However, it is now starting to re-establish its position in the evening sky.

Later, I saw the comet again, and it now appears as a moderately "bright" fuzzy ball, slightly brighter in the centre, through my telescope.

Later still, I had a look at M1, the 'Crab Nebula. Viewed through my telescope, it was very dim, barely visible, appearing as a very dim ovoid. Overall, despite its fame, I found it singularly underwhelming!

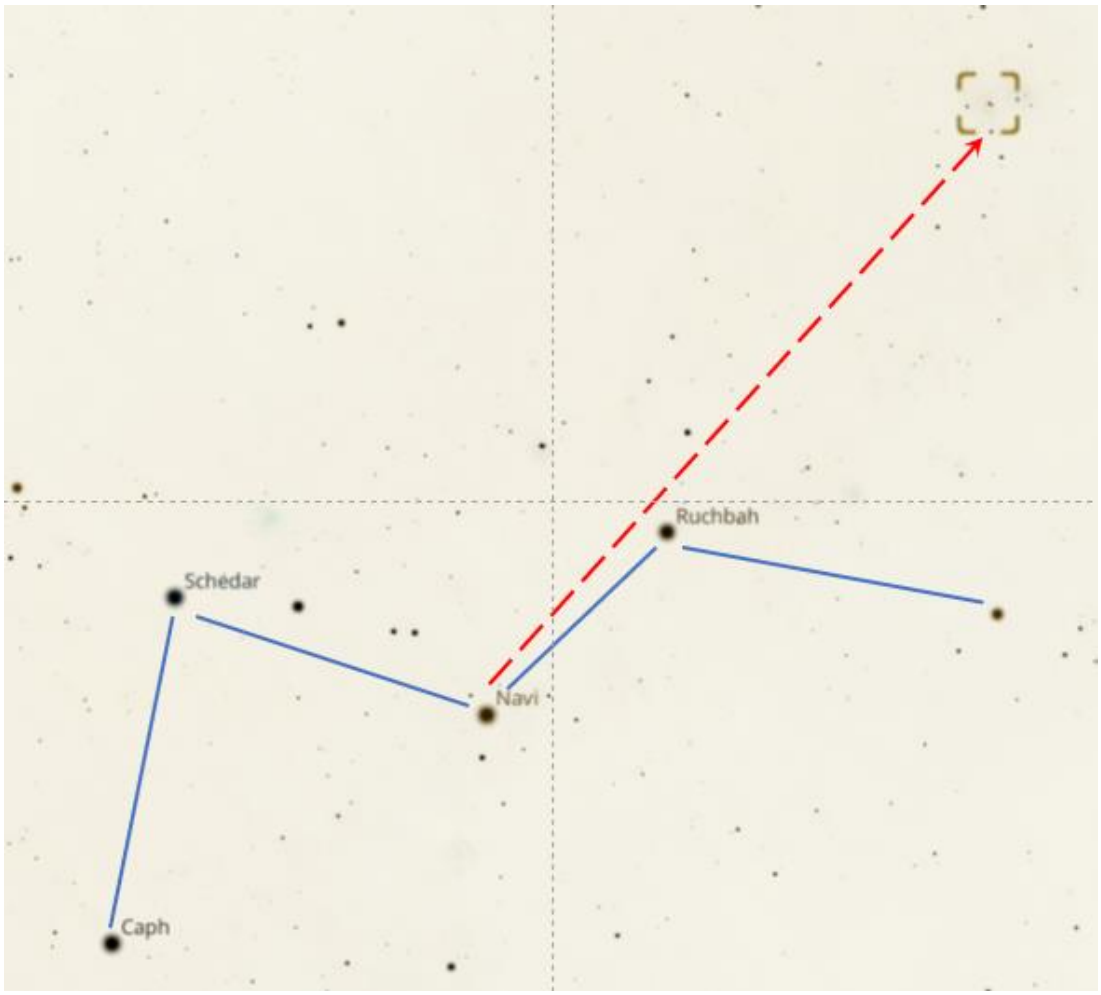
NGC 1514, in Taurus, a planetary nebula, appeared as just a "star", with direct viewing, but with the use of the Oxygen 111 filter, I could see the central star, surrounded by a fuzzy, circular halo. It is unusual to be able to actually see the central star, as they are usually, as in the case of M57, only about magnitude 16, so only visible in very large telescopes! But the one in NGC 1514 is of magnitude 9.4, so actually visible in my telescope! The same is true of the central star (White Dwarf) visible in NGC 6826, in Cygnus.

Another planetary nebula, NGC 1501, appeared as a bluish, very small disk of light, similar in size and appearance to Uranus or Neptune. No wonder early astronomers called these types of objects “Planetary Nebulae”, even though they are nothing to do with planets.

At last, the "planet drought" of earlier on, is well and truly over, with Venus, Saturn, Jupiter and Mars, now all visible during the evenings! I still find Mars a little too small, at 11' arcseconds, to really see any features, apart from a hint of them, even at 300X! But Jupiter is a splendid sight again, high and brilliant in the evening skies

Object of the month – The Double Cluster (NGC 869 and NGC 884) - Martin Howe

The Double Cluster, also known as NGC 869 and NGC 884, is a pair of open star clusters located in the constellation of Perseus. These two clusters make for a stunning view through binoculars or short-focal length telescopes. The clusters are relatively easy to locate, and sharp eyes should be able to see the pair as a faint smudge from a dark sky site. The pair will be riding high, almost overhead in the mid-evening sky, during December. To find them, project a line through one of the arms of the “W” asterism of Cassiopeia – from Navi (gamma Cassiopeiae) through Ruchbah (delta Cassiopeiae) – broadly in the direction of the bright star Capella, a little over 7 degrees (14 full Moon-widths) – see the chart below from Stellarium.



The Double Cluster consists of two separate star clusters, each containing hundreds of stars. NGC 869 is the brighter and more easily identifiable of the two, and it lies slightly to the northeast of its partner, NGC 884. These clusters are approximately 7,500 light-years away from Earth.

Both clusters are relatively young, with ages ranging from 10 to 15 million years. By comparison, our Sun is about 4.5 billion years old and even the “young” Pleiades open cluster in Taurus is about 100 million years old. The individual stars within the Double Cluster vary in temperature and age, resulting in a broad range of colours. In general, the stars of NGC 869 are slightly younger and more massive than those in NGC 884. As a result, many of the stars in NGC 869 are young hot blue supergiants. These stars are primarily of spectral classes B and A, with their blue colour reflecting their high temperatures, often exceeding 10,000 degrees Kelvin.

In contrast, NGC 884 has a greater proportion of red and yellow stars, many of which are cooler, older, and less massive than their blue counterparts. These stars, with spectral classes F and G, have surface temperatures between 5,000 and 7,500 degrees Kelvin, giving them their characteristic warmer colours (our Sun has a spectral class of G). There are also a number of older M-class red supergiants dotted through the clusters, again, primarily within NGC 884. Anyone who is interested in seeing a visual representation of spectral class and temperature versus size/luminosity should do an internet search for the “Hertzsprung-Russell diagram”.

The image below was taken with an ASI294MC camera attached to a 127mm refractor. It comprises of thirty-four 50-second exposures through an L-Pro light pollution filter. NGC 869 is in the upper right of the image, with NGC 884 to the lower left.

A new generation of telescopes will probe the 'unknown unknowns' that could transform our knowledge of the universe

Acknowledgement: This article was written by Richard Massey, Professor of extragalactic astrophysics (dark matter and cosmology), Durham University, and was first published in. THE CONVERSATION on 17th October 2024. 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/a-new-generation-of-telescopes-will-probe-the-unknown-unknowns-that-could-transform-our-knowledge-of-the-universe-240078*

In recent decades, we've learnt huge amounts about the universe and its history. The rapidly developing technology of telescopes - both on Earth and in space - has been a key part of this process, and those that are due to start operating over the next two decades should push the boundaries of our understanding of cosmology much further.

All observatories have a list of science objectives before they switch on, but it is their unexpected discoveries that can have the biggest impact. Many surprise advances in cosmology were driven by new technology, and the next telescopes have powerful capabilities.

Still, there are gaps, such as a lack of upcoming space telescopes for ultraviolet and visible light astronomy. Politics and national interests have slowed scientific progress. Financial belts are tightening at even the most famous observatories.

The biggest new telescopes are being built in the mountains of Chile. The Extremely Large Telescope (ELT) will house a mirror the size of four tennis courts, under a huge dome in the Atacama Desert.

Reflecting telescopes like ELT work by using a primary mirror to collect light from the night sky, then reflecting it off other mirrors to a camera. Larger mirrors collect more light and see fainter objects.

Another ground-based telescope under construction in Chile is the Vera C. Rubin telescope. Rubin's camera is the largest ever built: the size of a small car and weighing about three tonnes. Its 3,200 megapixels will photograph the whole sky every three days to spot moving objects. Over the course of 10 years, these photographs will be combined to form a massive time-lapse video of the universe.

Astronomy used to be a physically demanding job, requiring travel to remote telescopes in dark sites –- but many astronomers began working from home long before COVID. In the late 20th century, major ground observatories started to put in place technology to allow astronomers to control telescopes for observations at night, even when they were not there in person. Remote observing is now commonplace, carried out via the internet.

Expect the unexpected

The view of any telescope on the ground is limited, though, even if it's on top of a mountain. Launching telescopes into space can get around these limitations.

The Hubble Space Telescope's operational history began when the space shuttle lifted it above the atmosphere on April 25 1990. Hubble got the full 1960s sci-fi treatment: a rocket to launch it, gyroscopes to point it, and electronic cameras instead of photographic film. But one plan fell through: for Hubble to host a commuting astronaut-astronomer, working decidedly away from home.

Hubble was designed to take a census of the Milky Way and its neighbouring galaxies. Its successor, the James Webb Space Telescope, would study even more distant galaxies.

Both telescopes have revolutionised our understanding of the universe, but in ways nobody foresaw. Hubble's original plans mention none of the discoveries now seen as its greatest hits: plumes of water erupting from Jupiter's moon Europa, the vortex around black holes, invisible dark matter that holds the universe together, and the dark energy that is pulling it apart.

Webb, launched on 25 December 2021, now spends a third of its time looking at planets around other stars that weren't even known about when it was designed.

The stated goal of an expensive telescope is usually just a sales pitch to space agencies, governments and (shhh…) taxpayers. The Webb telescope should achieve its original science goals, but astronomers have always known that seeing further, finer or in more colours can achieve so much more. The unexpected discoveries by telescopes are often more significant than the science objectives stated at the outset.

Taking the long view

For scientists, it's a relief that telescopes go beyond their brief, because Hubble and Webb both took more than 25 years from napkin to launch. In that time, new scientific questions arise.

Building a large space telescope typically takes about two decades. The Chandra and XMM-Newton space telescopes took 23 years and 15 years to build, respectively. They were designed to

observe X-rays coming from hot gas around black holes and galaxy clusters, and were launched very close together in 1999.

They were followed by Japan's Hitomi X-ray satellite, which took 18 years to build, and the German eRosita instrument on Russia's Spektr-RG space observatory, which took 20 years.

Similar timescales apply to the European Space Agency's Hipparcos and Gaia space telescopes, which have mapped all the stars in the Milky Way. The Cobe and Planck missions to study the microwave-light afterglow of the Big Bang also took two decades. Precise dates depend how you count, and a few exceptions have been "faster, better, cheaper", but national space agencies are generally risk averse and slow when developing these projects.

The latest space telescopes are therefore millennials. They were designed at a time when astronomers had measured the universe's newborn expansion following the Big Bang, and also its old-age, accelerating expansion. Their main goal now is to fill the gap - because, surprisingly, interpolations from early times to late times don't meet in the middle.

The measured rates for the expansion of the universe are inconsistent, as are results for the clumpiness of matter in the cosmos. Both measurements create challenges for our theories of how the universe evolved.

Observing the middle age of the universe requires telescopes operating at long wavelengths, because light from distant galaxies is stretched by the time it reaches us. So, Webb has infrared zoom cameras, while the European Space Agency's Euclid space telescope, launched in 2023, and Nasa's Nancy Grace Roman telescope, which is set to launch in 2026, both have infrared wide-angle views.

Three buses come along at once

Most stars shine in ultraviolet and infrared colours that are blocked by the Earth's atmosphere, as well as the colours our eyes evolved to see.

Extra colours are useful. For example, we can weigh stars on the other side of our galaxy because massive stars are bright in infrared, while smaller ones are faint – and they stay that way throughout their lifetimes. However, we know where stars are being born because only young stars emit ultraviolet light.

In addition, independent measurements of the same thing are vital for rigorous science. Infrared telescopes, for example, can work together and have already made surprising discoveries. But it's not great for diversity that the Webb, Euclid and Roman space telescopes all see infrared colours.

Hubble's visible light camera has just been switched off due to budget cuts. Nasa will not swing back to ultraviolet wavelengths until the 2030s, with the Ultraviolet Explorer and Habitable Worlds Observatory.

Earthly politics gets in the way, too. Data from China's Hubble-class space telescope, Xuntian, is unlikely to be shared internationally. And in protest at Russia's invasion of Ukraine, in February 2022 Germany switched off its eRosita X-ray instrument that had been operating perfectly, in collaboration with Russia, a million miles from Earth.

Cheap commercial launches may save the day. Euclid was to have lifted off on a Russian Soyuz rocket from a European Space Agency spaceport in French Guiana. When Russia ended

operations there in tit-for-tat reprisals, Euclid's launch was successfully switched at the last minute to a SpaceX Falcon 9 rocket.

If large telescopes can also be folded inside shoebox-size "cubesat" satellites, the lower cost would make it viable for them to fail. Tolerating risk creates a virtuous circle that makes missions even cheaper.

Telescopes are also being tried in innovative locations such as giant helium balloons and aeroplanes. One day, they might also be deployed on the Moon, where the environment is advantageous for certain types of astronomy.

But perhaps the most unusual telescope technology, which may bring the most unexpected discoveries, is gravitational wave detectors. Gravitational waves are not part of the electromagnetic spectrum, so we can't see them. They are distortions, or "ripples", in spacetime caused by some of the most violent and energetic processes in the universe. These might include a collision between two neutron stars (dense objects formed when massive stars run out of fuel), or a neutron star merging with a black hole.

If telescopes are our eyes, gravitational wave detectors are our ears. But again, current gravitational wave detectors on Earth are mere dry runs for the ones astronomers will ultimately deploy in space.

Asked what the next generation of observatories will discover, I have no idea. And that's a good thing. The best science experiments shouldn't just tell us about the things we expect to find, but also about the unknown unknowns.

Up Next:

NEXT MEETING: 8pm Friday 13 December – Nonsuch High School

This will be our AGM with Quiz, Raffle and Christmas Fare.

There will also give a presentation on the sky at night for the coming month.

NEXT REGULAR MEETING: 8pm Friday 10 January – Nonsuch High School

Tim Parsons will give a talk entitled "A massive star menagerie: touring among the upper reaches of the Hertzsprung-Russell diagram".

*There will also be a presentation on the sky at night for the coming month***.**

NEXT USER GROUP:

Suspended until further notice.

NEXT DENBIES OBSERVING SESSION:

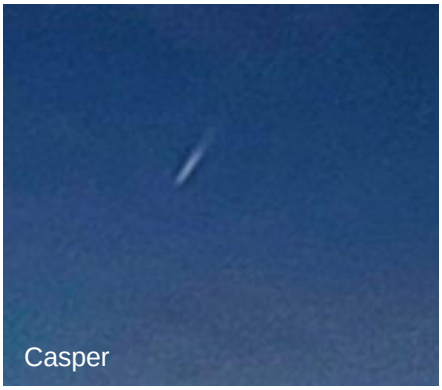
The next sessions, allowing for moon rise & set times and cloud conditions, should be sometime around the new moon which is on 30 November and 30 December.

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 25 November to 6 December and 25 December to 5 January although the latter, of course, is over the Christmas – New Year period!

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.

Comet C/2023 A3 Tsuchinshan–ATLAS Images


Casper


Matt Graydon


Christine


John

Martin Howe

Chris Kibbey

Aurora Images

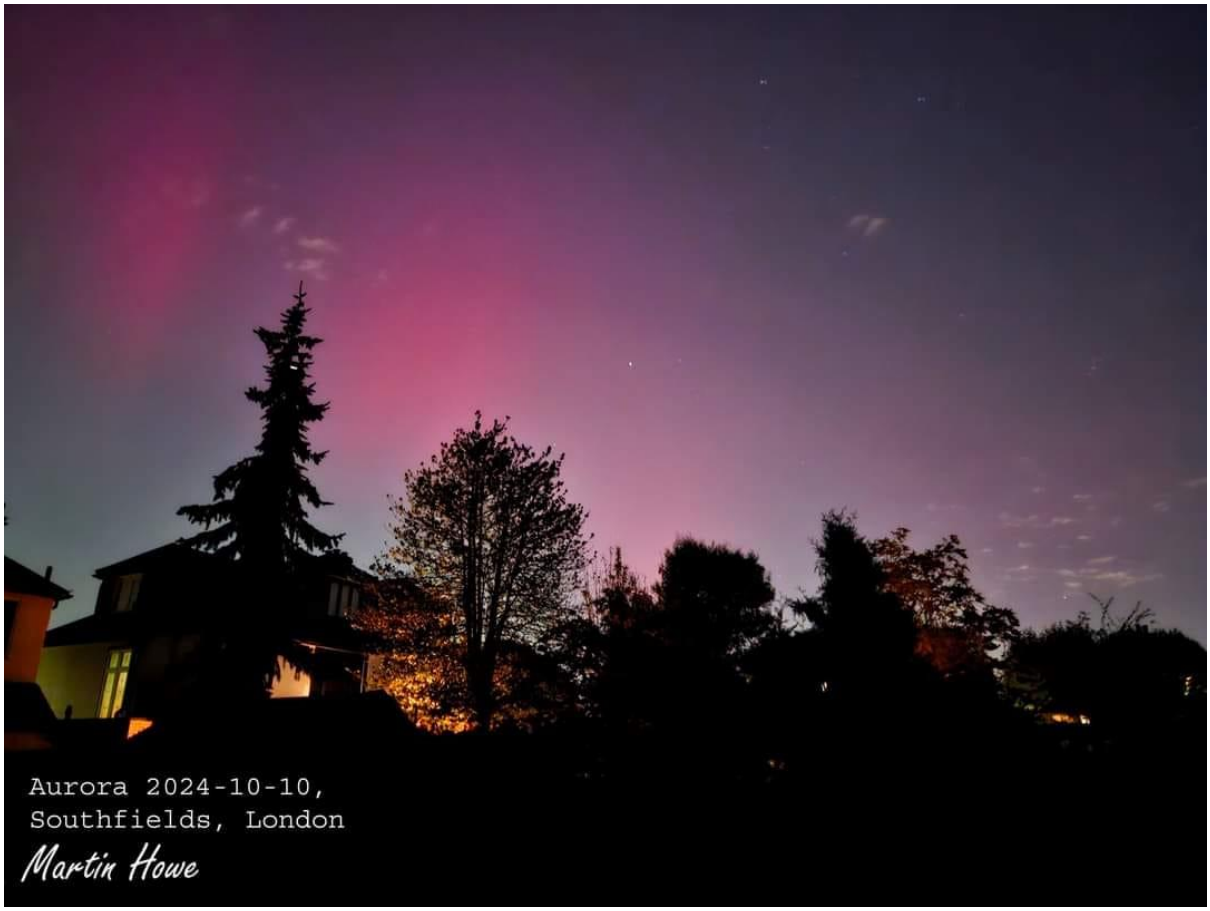
Casper

Adrian Bourne

Matt Graydon


10 October 2024 8:25pm
Jay Kallee


Shirish Phade


Aurora 2024-10-10,
Southfields, London
Martin Howe


Chris Kibbey