



# Breckland Astronomical Society

Affiliated to the British Astronomical Association and the Federation of  
Astronomical Societies

## ***EXTRA*** ***TERRESTRIAL***

**Newsletter September 2025**



Registered Charity no, 1044478

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Copy is always needed for this newsletter. Articles with an astronomical theme are welcome but anything of likely interest to the membership will be considered. Text or Word documents preferred but handwritten submissions also welcome.

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# Chairman's Notes

## September and October 2025

Welcome back to astronomy season with the magnificence of the Milky Way Galaxy as viewed from within its plane.

The August meteor shower, the Perseids was observed by some of us at the observatory. Three of us caught a fireball leaving a train for about 10 seconds. The two of us that saw it said it looked green. This is due to 'excited atomic oxygen'. A few good Perseids were seen by many members, many of the wider public were disappointed as usual as it is over hyped by many media stories. But in at least equal number many appreciated spotting some impressively bright meteors. It seemed anecdotally it was a fairly strong shower with a broad maximum. As expected by astronomers the moon interfered a lot this year.

Attempts to photograph Interstellar Comet 3I/ATLAS resulted in a too high detection limit. It was lost among milky way stars and low down the stars were large. It was just too faint while in a suitable position. It looks difficult to find now with our telescope as it approaches its nearest point to the sun and gets lower in the sky. NASA's Horizons tool is useful for generating ephemeris (coordinates) for these objects and Near Earth Objects.

### The Solar System

The Sun has been a bit less active in the last two months but a few spots always visible and we are still in Solar Maximum. A really long prominence was visible by some.

The Moon is in the evening sky for the first half of each calendar month. The Waxing Crescent is very low this season September 26 and October 26 appearing in the SW after or at sunset as a backward C shape, almost completely 'upright'. Look out for the Jewelled Handle on Sinus Iridium catching the Sun while the mare floor is dark on September 2 October 2 and October 31.

DO NOT MISS the Total Lunar Eclipse in progress at Moonrise in the East on the evening of September 7<sup>th</sup> (Sunday) it is a strange one, as during twilight, in the fading "belt of venus" opposite the sundown position, there will be a faint low blood moon rising at 7:40 with its lighter lower left glowing slightly brighter. This is a great opportunity for telephoto lens photography. Wishing for clear skies, we may only get to see it from about 7:48 when twilight darkens. Shortly afterwards, at about 7:50 the moon edge emerges from the shadow. The whole thing will look rather eerie as the shadow edge traverses the lunar disk until 8:55pm when just a penumbral eclipse is left.

Venus gets occulted on 19 September daytime 12:49:00 by a 5% crescent moon. It is 27 degrees to the right of the sun and slightly higher in altitude at 45° v 37°. If clear, Venus is easy to spot

directly but DO NOT look anywhere near the SUN or especially let anyone grab binoculars or telescopes. Preferably position your equipment behind a wall or hedge blocking the sun. It is only 12 arc seconds across.

Venus gets slightly lower and further south in the mornings throughout the two-month period. At 6:40 on the 19<sup>th</sup> of October a crescent moon is near it in the morning sky if you happen to be up early.

Jupiter is in Gemini in the early morning sky, passing Wasat in Gemini on 7 September. It moves right in front of the middle of Open Cluster NGC 2420 on 7 October.

Ganymede's shadow transit should be spectacular on the morning of 6 October, followed by Io's with both moons appearing close to each other. Midnight – 2:30 am. Europa and Io's shadows transit next to each other on the morning of 15 October. Catch it early as it rises on after 11:30 on the evening of the 14<sup>th</sup>.

Saturn is looking beautiful with thin rings in the late evening and morning sky, Neptune is fairly near it. The rings are fairly dark, fairly thin, and will close up again slowly towards November. At this rare point in its orbit, it becomes able to see inner moons like Enceladus, and even Mimas. We clearly revealed Mimas on the 9 inch Celestron.

Uranus is in Taurus below the Pleiades magnitude 5.6 diameter 3.8 arcsec. Look for its moons in large telescopes.

Neptune is a few degrees upper left of Saturn. Look for Triton in large telescopes.

Pluto (and Charon) is magnitude 15 and lies just over halfway between the South horizon and Deneb Algiedi in Capricornus in mid September at about 10pm. It is 3 degrees left of M75 and 2 degrees S of 4 Capricorni.

The dust in the plane of the Solar System can be seen at equinoxes from dark sites. What to look for is a very faint, very large diffuse triangle poking up from the W horizon in the evening in spring, or E horizon in the morning before dawn in autumn. I have seen it from Haw Wood Farm and Wales. It is subtle and extremely affected by light pollution and the moon. You may have to shake your head or rotate and move it around to perceive the most sensitive peripheral effects of your night vision. Photographs are difficult also but after some processing I managed to get one in Spring from the South Wales valleys. It is what was studied by Brian May for his PhD.

The best time to see the 'Zodiacal light' is September 20 – October 5 at 4:30-5:00 am and this year Venus on the horizon and Jupiter mark out the extent of it. It should extend from Regulus and across the faint constellation of Cancer containing the Beehive Cluster (M44).

The Orionids Meteor Shower should be good this year – peaking around 21 October, it should be dark then to see Comet Halley's debris enter Earth's atmosphere.

Largest asteroid 1 Ceres reaches its brightest close to eta Ceti and NGC 246 in Cetus, at 7.6 magnitude. Not a close opposition but very visible in binoculars if you know what stellar point to look at. It is 1.9AU from us. Imagine Giuseppi Piazzi discovering it in 1801 as you observe that untwinkling dot.

Asteroid 2 Pallas is 10<sup>th</sup> magnitude and moving southward slowly to the left of the main pattern of Aquila.

Near Earth Asteroid 2025 FA22 passes 2.2 lunar distances (0.006 AU) from Earth on September 18<sup>th</sup>. It flies across the sky and brightens from 20<sup>th</sup> to 13<sup>th</sup> magnitude, coming from Southern Hemisphere to Northern, so is best to observe on the night of September 18-19 at midnight, a few degrees below the Pleiades. It is moving very rapidly North and West towards the star Alpheratz as it shoots by Earth, and in the next two days it will decrease in brightness slowly then more rapidly back to 15<sup>th</sup> magnitude. It is about 166m across. You will need NASA's Horizons tool to calculate coordinates from your site for the exact times (make sure you include J now coordinates (of the time) and not J2000.0 epoch coordinates. You may be able to pick up the movement with your eye in a good telescope.

## Deep Sky

Brighter objects. As the sky darkens at twilight, the Milky Way arches overhead. In the north are NGC 457 (the Owl Cluster) and NGC 663 in Cassiopeia and the Perseus Double Cluster, from which you can easily find Stock 2 (the Musclemans Cluster). Kemble's Cascade and its "splash pool", NGC 1502, are also conveniently placed, and the cascade is near-vertical in autumn evenings, adding to the ribbon-waterfall illusion. To the east of them lie M34 in Perseus and NGC 752 in Andromeda, which is at the brighter end of a hockey-stick asterism that has the double-star 56 Andromedae at its end. The latter can be seen on really good nights by the naked eye easier than M33 in Triangulum.

More open Clusters are visible in the southern sky in the region of Ophiuchus. These include Melotte 186, NGC 6633, IC 4756, and M11, The Wild Duck Cluster, all of which are easily visible in 50mm binoculars. Even further to the south-west is a group of open clusters in Serpens and Sagittarius that includes M16 (Eagle Nebula), M17 (the Swan/Omega Nebula), M23, M24 (the Sagittarius Star Cloud, which is the densest accumulation of stars visible to binoculars anywhere in the sky), and M25. Also worth enjoying in this region of sky is the denser part of the Milky Way that forms the Scutum Star Cloud as a backdrop.

(see chart/picture later in the magazine)

Sagittarius has M8 and M20 the Lagoon and trifold nebulae as the main showpiece of the constellation but M22 is an impressive big globular cluster that is overlooked.

And don't forget M27 the Dumbbell (apple core!) nebula and M57 the Ring nebula now lower in the west, and M13 the best globular is still on good show.

Off the Milky Way we have Bode's and the Cigar galaxy M81 and M82 in Ursa Major coming round again. This constellation is now in the Northern Sky, but still perfectly high enough to view all year round (see chart later in the magazine). In Andromeda M31 of course is the best to look at, even with the naked eye, and is at its peak viewing season now.

## Observations

Here are some of my observations from my back garden in Norwich at 1am on June 28:

*Very clear! Transparent skies...but had been very hot late slow to cool (21.5degC dewpt 16) humidity 73%*

*Summer twilight still visible*

*Beautiful long meteor N Right to left from Pegasus/Aquarius. About 0m (zero magnitude)*

*Could make out Ophiuchus' asterism by eye – aka Poniatowski's Bull. 66-70 Ophiuchi.*

*Got 8"SCT out of shed no battery no bother*

*Found NGC 6572 small PN green colour only apparent with direct vision at 78x*

*No luck with M101 in twilight, lower NW*

*M51 got on target but galaxy was really faint in comparison to the stars at the centre of each galaxy.*

*M3 too hard to find.*

*M13 Amazing. Couldn't see nearby galaxy*

*M57 no problem straight on it.*

*M56 quick also.*

*M71 fairly quick. Diffuse.*

*Got UHC filter out and found Veil nebula in Cygnus - both parts. Good with very averted vision and movement. Eastern bit was spotted and I panned N to reveal an even brighter knot. It clearly stood out. So I thought I'd try the Crescent nebula NGC 6888. It took a little find with Stellarium web and I found the W spiral asterism and saw some nebulosity around the right star for sure.*

*Amazing from a city!*

## What we've been up to

Observing has been good due to clear skies, but the mirror's exact figure suffered from expansion due to the heat in the dome with all the sun we had. So it was wobbly images for a couple of hours into the night until it cooled again. Gerry has now learned the ropes of using the 20 inch controls well. It didn't take long! Along with other members that help out, Gerry's knowledge of astronomy as a subject is very valuable to the society. We have done some impressive observing e.g. finding Mercury and stars in very bright twilit skies. Also some amazingly deep things such as the central star of M57 and Sharpless 2\_108 later on, near midnight.

We attended the Teddy Bear Festival and got loads of visitors and interest was fantastic. A more local crowd who we were really pleased to chat to about what we do. There really was a lot of interest. Let's hope it creates new talk visitors and participants. Many thanks to Mark for doing so much with the wood and teaching us how to sculpt straw. He basically went out and fixed up the bears – Ursa Minor lost his telescope very shortly (perhaps in wind) and one of their heads was a little shabby (perhaps also wind?). However, the sentiment was there(!) and I think they were appreciated – it was good to be part of the village festival. Due to the comments about the mirror being dirty it was cleaned one Tuesday and looks lovely now. It was also recollimated, twice. It often goes out quite a bit.

At the time of writing, we are doing astronomy at a wedding for one of our members and occasional talk attendees. Plus, I have given a talk about space and our society at Coronation House, a Nursing Home in Thetford. We are getting ready for our Open Evening.

Mick Ladner is starting to organise the visits for us for the upcoming autumn, we always find we have to rely on a small core of dedicated volunteers to show groups (mainly children) the wonders of the night sky.

Marie Allen, Spencer Allen's widow, now in her later years, was brought to a talk in July from her nursing home with nurses. She was honoured to see the talk, Spencer's Rose and she spoke with a childish delight about how Spencer had put so much into the Observatory, having managed its build and generated the funds and spent lots of time there with friends. She and accompanying nurses came over to the building after the talk and was incredibly heartened to see Spencer in the photograph album (returned by Chris just at the right time) It was a big moment for her. If you haven't looked check out the building of the observatory in the July 1st edition of ET.

### **THE OBSERVATORY WILL BE 25 YEARS OLD IN OCTOBER!**

Brian Mitchell, a former member, solar expert and dedicated amateur, having made a long and impressive record of accurate observations of the Solar disk is wanting to donate his equipment to a good home, see his advert below. Brian entertained us a few years back with the story of him grinding a large telescope mirror and about his solar observation and records.

## **Recreation centre news**

This year, parking at the summer talks is something we need to do something about, especially as we pay for hall hire. We do have a line of communication with the current trustees of the recreation ground. The gate to the field had to be locked due to the growing threat of traveller occupation which would certainly affect astronomy there. We have been given a key to the gate and 4 car passes.

Good news though some young little owls were spotted by us around the rec at the start of July and were heard for a while. The area is clearly still good for wildlife, Tawny Owls are heard throughout the year.

## **Local area**

All the new builds around the observatory have been done with reasonable care for dark skies. The lights on the approach road from the A11 have been removed. The Ellingham Green Flagship site is fairly dark except for now a few bright sensor lights people have brought - these do not affect the field though. One light appeared on a house on the new development to the North of the

field and this was kindly switched off on the night via social media. The owner was surprised it was too bright, but it clearly was. There is/are currently a couple of occasional outdoor lights to the SE and SW of the observatory that are on for a short while - they do go off. While they are on, we do not know when or if they are going to go off, and it seriously affects dark sky observing. Even windows can be a distraction to the dark adapted eye. And also the scout hut light was left on one night a second time – this had to be covered again. I think most non-astronomers don't realise something as common as a light bulb can ruin astronomy as much as we know it does.

We've (or should I say mostly Keith Fowler has) been inspired to create a Dark Sky leaflet and a fantastic looking new webpage (accessed via a tab) with a reminder of its effect on wildlife as well as us astronomers. It has some details on light requirements in the countryside.

<http://www.brecklandastro.org.uk/>

I have measured some fairly good sky brightness readings on the darker nights this year. 21.10 is the best value in magnitude per square arc second which is 400 micro candela per sq metre ( <https://unihedron.com/projects/darksky/magconv.php> ). The main conclusion from this is that the site is still a reasonable dark sky discovery site, where the sky glow has not increased in the last 15 years when it was first measured by Unihedron sky quality meter.

## Light pollution threats

Snetterton has increased in size and light, 5 miles to the south, and the agricultural centre to the NE is rather bothersome. However a single light could pop up anywhere within a ~ 2 mile radius (containing 10,000 people) and ruin the sky at any time. The biggest threat is the early (dastardly) plans to sell off the field metres from the observatory to the South. This would completely destroy the observing that could be done – comments welcome. The South Horizon from the dome is an amazing and special feature containing wonderful deep sky objects and should be a protected feature of our observatory, as it was sited there first.

## Talks:

**Review of the July Talk by Jonathan Clough** “Something old something new something red something blue.”

*Jonathan is a practical astronomy guide on board cruise ships and works with Paul Fellows as part of Cambridge Astronomy Society. We hear today about a tour of the Summer Sky.*

It starts with the “Old” object NGC6791, 8bn years old, in the constellation Cygnus.

The “New” object is the M16 eagle nebula cluster – very fresh stars are lighting the nebula.

The “Red” objects is open cluster NGC6823 again in Cygnus

And the “Blue object” is NGC 188 aka the “Polarissima cluster”

Globular clusters contain Population II (low metallicity, old) stars that are 11-13 billion years old. They are huge in size and are distributed around the outside of the Milky Way's galactic bulge as well as around other galaxies centres.

Around our Galaxy, Omega Centauri is the biggest of the globulars, containing over 10 million stars! However we can't see that from north of about 40 degrees latitude.

M13 is also quite big, in it are some blue stars among the old red stars, called "*blue stragglers*". Some of the stars at the centre of the more concentrated cored globular clusters are so densely packed they crash into each other and destroy themselves and produce some hot new blue stars from the debris.

The Hyades and Pleiades have newer stars in them, which are called Population I stars.

NGC 6791 a faint red open cluster in Lyra, is 8 billion years old and lies 13,000 light years away, half way towards the centre of the galaxy. It is very large containing about 10,000 solar masses but it's not drifted apart yet because it's so big. It managed to drift away from the tidal forces at the centre of the galaxy and produce some newer stars in it. Stats: 8.2m 16' diameter.

NGC6611 is an open cluster in the Eagle nebula containing very young stars. Named after Aquila the Eagle even though it isn't quite in the constellation. It is 35 light years across and 376 stars that are 1-6 million years old. That is MILLION not BILLION, making these very young by cosmic standards.

Cluster NGC 6823 is similar to that of the eagle nebula, located in Vulpecula.

The stars average 2 million years old with some just 200-500 thousand years old. The latter are so young they are not even yet on the main sequence of stars. It contains 92 stars over 13th magnitude all O and B hot stars. The nebula is very red made up of pretty much all Hydrogen alpha emission and it has a dark finger within it. His image was very grainy.

NGC 188 was the bluest cluster. It is very old, 6.8 billion years old and many are white dwarves. It lies way above the galaxy plane and has 550 stars with a total magnitude 8.1. It lies near Polaris, and is called Polarisissima so can be seen all year round.

The above is also called Caldwell 1. Patrick Moore compiled a catalogue purely for observers, starting from the North and working South. These are the Caldwell objects and there are 109, like the Messier objects. You can play Caldwell bingo too!

Next we look at some stars. E.g. Arcturus is an older version of our Sun which has started to run out of fuel and the core judders and collapses to restart a wave of fusion that makes the star expand. It is a red giant. Arcturus is 20 times larger than our Sun.

Jonathan relates Deneb to Father Ted teaching Dougal about perspective. It is huge and much further away so looks similar in brightness.

There is a legend of the Cowherd and the Weaver girl in Chinese folklore.

The Magpies open a bridge across the milky way on the 7th day of the 7th lunar month.

We then hear “How do you age a star?”, “How do clusters drift apart?” and that “The Plough” is an Open Cluster.

Thankyou for a nice overview of the summer sky (which will persist into autumn for us). It has given us some interesting objects to find and piqued some interest.

**August Talk by Jerry Stone – Island Zero (a serious first step for space habitation)**

*Jerry is a Freelance Space Presenter and gives presentations on Astronomy and Space Exploration. Who Lives in Hertfordshire. He is a public astronomy "consultant" and also very active in the BAA and in his own astronomical society Hertford A.S.*

There seems to be a shortage a people thinking about humanity these days. Our future. Media focus on war, economy is tightening. We need some big positive thinkers and serious ones...island zero.

It's been a long while Jerry did his last talk with us but he's done “Is Pluto a planet?” “Did we really go to the Moon”, And “The day we launched a woodpecker”.

What next?

He presents the “Island zero project” In collaboration with the British Interplanetary Society

First of all we ask Harvard and US students the following question among others (following the apollo missions):

“Is a planetary surface the right place for an expanding technological civilization?”

The answer comes back “No” due to their extreme environments and low gravitational potential among other reasons, such as you are not limited to 50% of sun power (day-night)

Gravity may be a problem. Babies born even on Mars probably won't be able to return to earth due to their bones and muscles being too weak to live under 1 'g'.

So where?

Potential locations involve a lot of space at the Lagrange points from the moon. Points L1 and L2 float either side of moon (They also apply for the sun - they are either side of the earth). L3 points are on the opposite sides of the parent body BUT they are unstable.

Points L4 and L5 are 60 degrees round the orbit ahead and behind the secondary body. They are stable but still not stable enough, so we can orbit things around them.

He refers to George O Neill's book “the high frontier” who came up with the concept of Island One - a 500 m diameter spaceship at a Lagrangian point. It had ring mirrors for adjusting sunlight that reflect waste heat. These are huge cities... utopias with beautiful drawings.

He mentions you can take roses but leave aphids, take bees but not wasps, no mosquitoes or lice, fleas, etc. etc., rats, flies, jellyfish. I.e. we can control ecology. That will probably be the most complex part of the project.

There are rings around it for agriculture with different climates in different rings. You can control seasons. Everything.

His island two 1975 was larger (100k people) and ring shaped. NASA sponsored a symposium at Stamford, then we got "Island Spring" which was miles across containing an area of land 16000 sq miles. Gravity is decreased as you go up the mountains at the edges.

Now we look at lunar bases

Lunar soil is composed of useful elements to make these from. It has much, much more titanium. And water. We can build an electromagnetic launcher in the vacuum with solar power. But not necessarily man the surface. We would need a 530m square by 5m deep open cast mine to make material to build this. Windows are to be made by floating silicon on molten tin. The launcher specs would be to accelerate at 33g over 8905m long (This is NOT for humans but for mining material) could even be shorter and higher 'g's.

(My question at this point is how would it be caught? And processed?)

Jerry says restrictions are cost and technology - well they were just after Apollo. Why didn't we build it then? The shuttle was supposed to be a biweekly launch like a plane. It was rather pie in the sky thinking.

Now things are different. We have new materials, computing power. We have the technology and can keep costs down for launches. Robots are great but we'd need 200 people to get this off the ground...literally.

Jerry set up a project at the British Interplanetary Society. Called SPACE :Study project advancing colony engineering (a forced acronym).

Every design assumed rotation to simulate 1g. At this spin rate stress on structure is big. And humans don't even like 1g. So how much can we reduce gravity? Nobody has the slightest idea! We need to establish the gravity level and make a test colony.

We'd also need mining.. processing of materials.. manufacturing.. assembly.. living quarters.. workshops.. offices..

So. We need an Island Zero.

It would be composed of modular component with the same design unlike the ISS which is a mish mash of fitting modules. Island Zero would spin to produce gravity. Also food growing could be tested.

One thing we do know is 0'g' is bad. Especially with blood flow. Then brain and eyes neurological functions and muscles waste. As does the skeleton. The heart weakens also and becomes a

round ball. We have some fascinating gravity calculations and test chambers and stairs in a ring designed 100 years ago!

Another version can be taken to Mars orbit but radiation shielding would be needed this far out. We can get Silicon from the Moon and Germanium from asteroid Psyche.

On Mars: Solar panels in space and microwave beam 10GW at each colony site. Allowing warming of cattle etc.

Space habitats now sound serious. Jerry did a great job of showing me the benefits of space habitation.

SO we had a long round of eager Questions – this was fantastic as Jerry said in review.

They were about Risks and dealing with unforeseen emergencies?

Jerry mentioned this is important due to its reduced warfare threat! Called the overview effect from Frank White. Space exploration basically counteracts war.

He stresses current technology is all that's needed.

Q has this been put to eg UK space steering committee? No.

AS asked about the rapid spin and small diameter proposed producing giddiness. Are the windows gonna be opaque. How is the sun going to affect humans spinning constantly?

There were more practical questions. I wish he could have stayed later but he had a train to catch. Thanks Jerry for hope for humanity – it was very credible on the whole and a great positive solution for us.

## **Coming up**

On the 12<sup>th</sup> of September, I am talking all about The Messier Catalogue in all its details and history and I hope to entertain with a small game at the end.

On 13<sup>th</sup> of October we have Dr Stephanie Buttigieg talking about Gravitational Waves as detected by LIGO and VIRGO including a summary of all the observations we have had and how this links to Black Holes of all sizes.

Coming up in November we have Dr Tim Pierce from Warwick University and we also have a Christmas Meal at the Crown planned (it is a great pub).

And as always thank you all for your contributions to the society and our mutual enjoyment of astronomy.

*Dan Self*

# John's News Notes

SpaceX Crew Dragon Capsule arrived at the ISS on Tuesday 26<sup>th</sup> June, carrying an Indian, a Hungarian, a Pole and a former NASA Astronaut Perry Watson.

The MX4 mission has been postponed several times due to technical issues with the Falcon 9 rocket.

NASA is to lose more than 2000 senior staff across ten regional centres.

Trump has named Transportation Secretary Sean Duffy as interim head of NASA.

Artemis Space Launch System and Orion crew capsule.

Axiom 4 astronauts splashed down 15<sup>th</sup> July in the Pacific after a 20 day space mission.

Jim Lovell passed away in August aged 97. RIP.

Remaining Apollo Astronauts are:

David Scott (Apollo 9 and 15)

Russell Schweickhart (Apollo 9)

Buzz Aldrin (Apollo 11)

Fred Haise (Apollo 13)

Charles Duke (Apollo 16)

Harrison Schmitt (Apollo 17)

April 2026 has been chosen as the date for Artemis II to launch to a free return trajectory around the Moon and back to Earth.

The James Webb Space Telescope has found a small moon around Uranus.

SpaceX launched Space Force X37B military space plane during August.

Also, SpaceX launched a Dragon Capsule to the ISS. It was the 50<sup>th</sup> Dragon to visit the ISS.

Ghana and Japan sign a Space Cooperation agreement to Advance National Development.

China plans to arm Tiangong space station with self-defence bots with robotic thrusters that can latch onto unidentified objects.

On the evening of Monday 25<sup>th</sup> August the Chinese tested a new environmentally safer rocket fuel Methanox, which left a mysterious white streak across European night skies.

Until Next Time.

*John Copsey*

# ASTRONISHING FACTS

These mind-blowing statements are truly worth sharing and is why I love astrophysics.

Sunsets on Mars are blue.

Venusian days exceed Venusian years.

Moon dust smells of gunpowder.

Uranus does actually look greenish.

Neptune is a tiny bit smaller than Uranus

...but it is a tiny bit heavier than Uranus.

Earth is the densest body in the Solar System.

Something weird is making Methane on Mars.

There was an excess of Matter over Antimatter produced in the Big Bang of the order of 1 part in a billion. Without that tiny imbalance, there would be no universe. Clear observations support this statement, a comparison of radiation to the mass of the universe.

Hold up your hand. About 65 billion neutrinos are passing through it each second.

If a black hole spin exceeds 84% of the speed of light, in theory the event horizon disappears, revealing a naked ring singularity. There may be a rule that forbids this, called the 'Cosmic Censorship Hypothesis'

Gravity is not a force. It is an acceleration upwards from the ground beneath us. The General Theory of Relativity is the most tested theory by observation.

If you could ride a beam of light at light speed, no time would pass, and so it would appear not to exist. (So therefore you can't!)

Jupiter has 2.5 times Earth's surface gravity

...except there's no surface.

...You plunge into ever thickening, darkening, toxic atmosphere until you burn up.

...If you are lucky you may see some beautiful sights on the way down before it rapidly darkens.

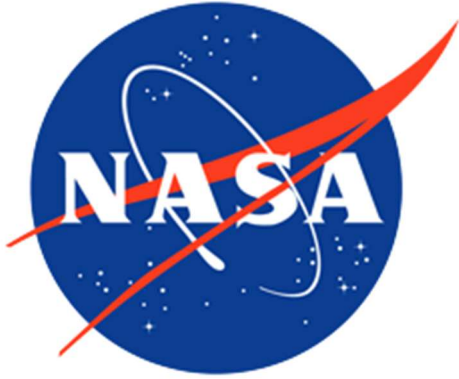
*Dan Self*

# Astronomy General Knowledge Quiz!

## Questions:

1	A graph used to plot the latitude over time of Sun spots
2	This is sometimes made from spider's web and is used to centre objects in the eyepiece.
3	This is the first trans-Neptunian dwarf planet discovered that is of a similar size to Pluto
4	Alpha Aurigae. At Magnitude 0.8 it is the 6 <sup>th</sup> brightest star in the night sky.
5	This unit is same size as the Celsius degree but the scale starts at zero. What is it?
6	The Orion Arm of the Milky Way is also known as what...?
7	This telescope is designed specifically for photographing wide areas of the sky.
8	This book was first published in 1766 and has been produced annually ever since. What is it?
9	What is the general name given to objects listed in the Messier Catalogue or the New- General Catalogue?
10	NGC4038 and NGC4039 in Corvus, 60 million light years away are often called what?
11	Aurora australis is also know as what?
12	This is a unit of magnetic flux equal of 10,000 gauss. But you may know it more having it seen them on the road.
13	This chap once built a 72" mirror and gave M1 its name of the "Crab Nebula"
14	The path one body makes around another body in space.
15	What does the first letters of each answer spell out?

# NASA's NICER Maps Debris From Recurring Cosmic Crashes



**Jeanette Kazmierczak**

**MAY 06, 2025**

## **ARTICLE**

For the first time, astronomers have probed the physical environment of repeating X-ray outbursts near monster black holes thanks to data from NASA's NICER (Neutron star Interior Composition Explorer) and other missions.

Scientists have only recently encountered this class of X-ray flares, called QPEs, or quasi-periodic eruptions. A system astronomers have nicknamed Ansky is the eighth QPE source discovered, and it produces the most energetic outbursts seen to date. Ansky also sets records in terms of timing and duration, with eruptions every 4.5 days or so that last approximately 1.5 days.

"These QPEs are mysterious and intensely interesting phenomena," said Joheen Chakraborty, a graduate student at the Massachusetts Institute of Technology in Cambridge. "One of the most

intriguing aspects is their quasi-periodic nature. We're still developing the methodologies and frameworks we need to understand what causes QPEs, and Ansky's unusual properties are helping us improve those tools."

Ansky's name comes from ZTF19acnskyy, the moniker of a visible-light outburst seen in 2019. It was located in a galaxy about 300 million light-years away in the constellation Virgo. This event was the first indication that something unusual might be happening.

A [paper](#) about Ansky, led by Chakraborty, was published Tuesday in The Astrophysical Journal.

A leading theory suggests that QPEs occur in systems where a relatively low-mass object passes through the disk of gas surrounding a [supermassive black hole](#) that holds hundreds of thousands to billions of times the Sun's mass.

When the lower-mass object punches through the disk, its passage drives out expanding clouds of hot gas that we observe as QPEs in X-rays.

Scientists think the eruptions' quasi-periodicity occurs because the smaller object's orbit is not perfectly circular and spirals toward the black hole over time. Also, the extreme gravity close to the black hole warps the fabric of space-time, altering the object's orbits so they don't close on themselves with each cycle. Scientists' current understanding suggests the eruptions repeat until the disk disappears or the orbiting object disintegrates, which may take up to a few years.



A system astronomers call Ansky, in the galaxy at the center of this image, is home to a recently discovered series of quasi-periodic eruptions.

Sloan Digital Sky Survey

“Ansky’s extreme properties may be due to the nature of the disk around its supermassive black hole,” said Lorena Hernández-García, an astrophysicist at the Millennium Nucleus on Transversal Research and Technology to Explore Supermassive Black Holes, the Millennium Institute of Astrophysics, and University of Valparaíso in Chile. “In most QPE systems the supermassive black hole likely shreds a passing star, creating a small disk very close to itself. In Ansky’s case, we think the disk is much larger and can involve objects farther away, creating the longer timescales we observe.”

Hernández-García, in addition to being a co-author on Chakraborty’s paper, led the [study](#) that discovered Ansky’s QPEs, which was published in April in *Nature Astronomy* and used data

from NICER, NASA's Neil Gehrels Swift Observatory and Chandra X-ray Observatory, as well as ESA's (European Space Agency's) XMM-Newton space telescope.

NICER's position on the International Space Station allowed it to observe Ansky about 16 times every day from May to July 2024. The frequency of the observations was critical in detecting the X-ray fluctuations that revealed Ansky produces QPEs.

Chakraborty's team used data from NICER and XMM-Newton to map the rapid evolution of the ejected material driving the observed QPEs in unprecedented detail by studying variations in X-ray intensity during the rise and fall of each eruption.

The researchers found that each impact resulted in about a Jupiter's worth of mass reaching expansion velocities around 15% of the speed of light.



The NICER (Neutron star Interior Composition Explorer) X-ray telescope is reflected on NASA astronaut and Expedition 72 flight engineer Nick Hague's spacesuit helmet visor in this high-flying "space-selfie" taken during a spacewalk on Jan. 16, 2025. NASA/Nick Hague

The NICER telescope's ability to frequently observe Ansky from the space station and its unique measurement capabilities also made it possible for the team to measure the size and temperature of the roughly spherical bubble of debris as it expanded.

“All NICER’s Ansky observations used in these papers were collected after the instrument experienced a ‘light leak’ in May 2023,” said Zaven Arzoumanian, the mission’s science lead at NASA’s Goddard Space Flight Center in Greenbelt, Maryland. “Even though the leak – which was patched in January – affected the telescope’s observing strategy, NICER was still able to make vital contributions to time domain astronomy, or the study of changes in the cosmos on timescales we can see.”

After the repair, NICER continued observing Ansky to explore how the outbursts have evolved over time. A paper about these results, led by Hernández-García and co-authored by Chakraborty, is under review.

Observational studies of QPEs like Chakraborty’s will also play a key role in preparing the science community for a new era of multimessenger astronomy, which combines measurements using light, elementary particles, and space-time ripples called gravitational waves to better understand objects and events in the universe.

One goal of ESA’s future LISA (Laser Interferometer Space Antenna) mission, in which NASA is a partner, is to study extreme mass-ratio inspirals — or systems where a low-mass object orbits a much more massive one, like Ansky. These systems should emit gravitational waves that are not observable with current facilities. Electromagnetic studies of QPEs will help improve models of those systems ahead of LISA’s anticipated launch in the mid-2030s.

“We’re going to keep observing Ansky for as long as we can,” Chakraborty said. “We’re still in the infancy of understanding QPEs. It’s such an exciting time because there’s so much to learn.”

**Download images and videos through NASA's Scientific Visualization Studio.**

**By Jeanette Kazmierczak**

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# Light Pollution

## Causes and Cures

*It's not only Astronomers who should care, and astronomers should be less pessimistic.*

I am often taken aback by what I hear people say about light pollution. Many non-astronomers have concerns about unnecessary government intrusion/regulation, and have come to see light pollution as an issue that only affects astronomers. And worse yet-- many of my fellow astronomers have come to believe that fighting light pollution is a lost cause, particularly near major urban areas. Happily, both of these points of view are uninformed.

### What is Light Pollution?

Light pollution is the shining of light where it does not belong. There are three kinds of light pollution. I'll start with glare because it affects everyone equally, not just astronomers. *Glare* is defined as stray light that shines into your eye. Glare is one of those things we put up with at night because we don't realize how unnecessary the annoyance is and how much trouble it causes. We just accept it without question. Glare makes driving and walking at night difficult, sending people indoors and limiting their enjoyment of their community after dark.

Light shining into adjacent property where it is not wanted is called *light trespass*. The enjoyment of the night sky is not possible under bright lights, whether it be by an amateur astronomer with telescope or a Dad who wants to teach his children the constellations.

*"The most important thing to know about light pollution is that it is completely unnecessary."*

Finally, we have light that is needlessly sent into the sky where it scatters off particulates in the air causing the air to appear to glow. We see this effect around any city (it's called a light dome) where stray light lights up the sky as if the moon were full, again making it impossible for people to see the sky in all its beauty. It is an unfortunate fact that many people these days don't even know what a wonder a starry sky is.

The most important thing to know about light pollution is that it is completely unnecessary. Fighting light pollution is not about eliminating lights, and it's not about telling people what to do with their own property; just as with excess noise, the property owner is responsible for the harm done when his light crosses the property line to harm the wellbeing of others. Fortunately, just like any other form of pollution, such a littering, the problem is easily remedied by making more responsible choices. Good lighting choices often increase the amount of light where it is wanted because the stray (wasted) light is directed to where it is needed rather than into the neighbour's yard, eye, or the sky. Alternatively, with the light focused where we want it, the same area can be lit with a lower wattage bulb, saving energy.

## What Causes Light Pollution?

In short light pollution is caused by careless outdoor lighting. Take glare for instance. Have you ever wondered why we put shades on the lamps in our houses? Is it purely decorative? No--the shades eliminate glare by diffusing the light so that it does not shine directly in the eye. Similarly, people shine lights at the ceiling or wall rather than directly into the room. The glare rule is simple: if you can see the light source directly then the light entering the eye is usually overwhelming it, causing discomfort and interfering with your ability to see. This is true for everyone, but it is a particular problem for the aging whose eyes are more prone to the effects of glare. The ironic aspect of glare is that by making it difficult to see, the response is typically to put in more/brighter lights!

Similarly, lights that needlessly shine into neighbouring properties cause light trespass.

Lights that needlessly shine into the sky overhead contribute to the glow seen above our communities. Badly designed fixtures that spill light in all directions rather than directing it to a specific location are mostly to blame. But we must also recognize that the root cause of many poor lighting choices is trying to light up that place "way over there" with a light "way over here." I see this in my own neighbourhood. We don't have a lot of street lights and often people will install a bright floodlight on the side of their house pointing out into the driveway. In order to light up the whole driveway some of these lights end up almost horizontal! I chuckle and shake my head every time I see a neighbour walking in from their car shielding their eyes with their hands because the glare from the light makes it impossible to see where they are going. But I am also saddened that when I take a walk at night I too have to shield my eyes and if the light shines into my yard it really bugs me that the enjoyment of my yard at night is greatly

## How Can Light Pollution be cured?

It's really very simple. It's just a matter of not being careless--a matter of putting a little bit of extra effort into our outdoor lighting choices. It starts by being aware that the problem exists and what the solutions are.

The primary solution is shielding. A shielded light directs the light to the area you wish to light up, while at the same time keeping it away from places you do not wish to light up, such as the sky, your neighbour's yard, or the eye of a passer-by.

Most lighting fixtures are purchased for their aesthetics or often simply because they are what is offered on the shelf at [B&Q](#) or your local hardware store. "I guess this will do", seems to be a common refrain. Until we care about good lighting as a society, why should the manufacturers and retailers care about giving us good lighting choices? Fortunately, good lighting fixtures are available today in a wide variety, but you may have to look beyond the shelf at [B&Q](#) (see the links at the end of this page).

As for lighting up the end of your driveway from your house, there are two solutions. The best solution is to put in a light pole closer to the area you wish to light; if you wish to light a very wide area, several poles may be necessary. I know this may be expensive, but considering the many

years you may be living at your home, the subtle benefits of eliminating glare will pay off in terms of your own comfort. Note also that glaring lights pose a safety threat, not only to passing motorists and pedestrians, but to the safety of your family. Without the glare everyone can see better at night, whether it be to see the toddler behind your car as you back out or an intruder approaching from the bushes. The second solution is quicker and easier: a motion sensor for your light. These lights are normally off, but when motion is detected, such as the car entering the driveway, they come on for a period of time. Although much better than a switched floodlight that must be left on to be working when you arrive home, or all night if you worry about unsavoury characters, you will still have to put up with glare when the light is on.

As aging lights are replaced--both our community street lights and our own yard lights--if we simply make better choices our quality of life will be improved. This improvement is not imperceptible. We may one day wonder why we never noticed how ugly it was before. A good example is the community of Cloudcroft, New Mexico. This is a small village that lights its streets with one of the worst lighting choices it could make. For years these lights have shown into the sky, windows, and into the eyes of passing motorists or those out for a stroll. But the simple addition of a [shield](#) to the existing light fixtures in our shopping district made a difference that was difficult to miss, although I suspect many simply had a happier, more comfortable experience without ever realizing why. Tourism is a primary economy [in many areas in need of lighting improvements](#), and I am certain that the softer more effective lighting has put more people on our boardwalks after dark. The bonus is that the light overhead diminished measurably, making Cloudcroft a better place for astronomy and for those on vacation who wish to have the chance to see a starry night sky (often for the first time).

As time passes it is quite possible that our grandchildren will one day be able to see a starry sky again from the city--there is no reason why they can't--as long as the light is simply directed only to where it is needed and nowhere else. Is that so much to ask?

Purchasing responsible outdoor lighting: see [www.darksky.org](http://www.darksky.org) (international – US based)

For UK, The Sky at Night Magazine has produced some more up-to-date information about lighting requirements.

Our scotopic vision is more sensitive in the green-blue region of the visible spectrum. Astronomers use red lights that don't stimulate the scotopic vision, and so don't affect accumulated night-vision sensitivity so much.

Modern LED lighting is a combination of a very blue (more harmful) emission and a broad yellow emission, giving an artificially produced white tone. This can interact with non-imaging cells in the human eye, switching on a response that causes awakening, thus disturbing sleep rhythms. While they are directed better, they are often more intense directly under the beam. The blue emission also scatters light much further and wider into the atmosphere, carrying the light pollution further, dependent on the humidity.

Purchase responsible outdoor LED lighting (UK):

Security – this needs to be tilted downwards

[Blooma Pietas NA-22WAFL-140-D-GR Graphite Mains-powered White LED Motion Floodlight 1800lm](#)

Stylish post down-lights for paths

[SLV Rusty Slot 500 Outdoor Post Light - Lyco](#)

Wall or Porch lights

[https://www.expertelectrical.co.uk/lutec-ghost-solar-solar-light-silver-integrated-led-ip44?vat\\_display=2&utm\\_source=adtraction&utm\\_medium=partner&utm\\_campaign=adtraction&at\\_gd=9A8C4259E0FBED55658728EAB1F9ACAF12BEB95B](https://www.expertelectrical.co.uk/lutec-ghost-solar-solar-light-silver-integrated-led-ip44?vat_display=2&utm_source=adtraction&utm_medium=partner&utm_campaign=adtraction&at_gd=9A8C4259E0FBED55658728EAB1F9ACAF12BEB95B)

If someone insists on doing sports outside, these are directional and well shielded

[Katana high output LED floodlight | DW Windsor](#)

# The Perseid Meteor Shower 2025



Each year, as August unfurls its gentle warmth across the Northern Hemisphere, stargazers and dreamers alike turn their gaze skyward with bated breath, awaiting the Perseid meteor shower—a dazzling cosmic performance that has enchanted humanity for centuries.

## The Perseids: Origin and Science

The Perseid meteor shower owes its existence to the comet Swift-Tuttle, a cosmic traveller that orbits the Sun every 133 years. As the Earth drifts through the debris trail left in the comet's wake, dust and particles—some scarcely larger than grains of sand—plunge into our atmosphere at incredible speeds, burning up and momentarily streaking the night sky with luminous trails. This phenomenon occurs annually, peaking in mid-August, as our planet crosses paths with the densest portion of the comet's remnants.

Swift-Tuttle, discovered in 1862 by Lewis Swift and Horace Tuttle, remains one of the largest known objects to periodically pass near Earth. Its debris, cast off over centuries, forms the backbone of the Perseids. Each meteoroid enters Earth's atmosphere at approximately 60 kilometers per second, igniting due to friction and creating the bright "shooting stars" that so captivate our imaginations.

## The Perseids Through History

The Perseid meteor shower has been recorded for over two millennia, with references found in Chinese records dating back to 36 AD. Early observers marvelled at the "tears of St. Lawrence," a

poetic name bestowed by Catholic tradition, linking the meteors' annual arrival to the feast day of St. Lawrence on August 10th.

Over centuries, the Perseids have sparked wonder and inspired mythologies around the world. In medieval Europe, the sight of falling stars was considered an omen—sometimes of fortune, sometimes of foreboding. In contemporary times, the shower is regarded as nature's own fireworks, celebrated by astronomers and casual observers alike.

## Scientific Significance

For astronomers, the Perseids are more than just an enchanting spectacle. The shower provides opportunities to study the composition of cometary debris, the dynamics of meteor entry, and the behaviour of Earth's atmosphere. Each meteor's brief, luminous flight is a window into cosmic processes that shape our solar system.

Meteor enthusiasts often use the Perseids to contribute data to global networks, tracking rates, brightness, and trajectories. Over time, these collective observations help scientists refine models of comet Swift-Tuttle's orbit and predict future meteor shower intensities.

## Cultural Impact and Modern Traditions

The Perseids have inspired countless works of art, literature, and music. Their annual arrival is marked by festivals, late-night gatherings, and public viewing events. In many cultures, catching sight of a shooting star is an invitation to make a wish—a tradition that transforms each meteor into a moment of personal significance.

## Global Visibility: Where to Watch

The Perseids are visible throughout most of the Northern Hemisphere, with peak visibility from mid-latitudes. North America, Europe, and Asia are particularly well-positioned.

## How to Capture the Perseids: Photography Tips

For those eager to immortalize the shower, astrophotography offers unique challenges and rewards. Here are a few pointers:

- **Use a Wide-Angle Lens:** Capture as much of the sky as possible.
- **Long Exposures:** Set your camera to take exposures of 15-30 seconds to catch the fleeting light of meteors.
- **Stable Mount:** Use a tripod to keep your camera steady.
- **High ISO Settings:** Increase sensitivity, but beware of excessive noise.

**Multiple Shots:** Take continuous photos over several hours to maximize chances of catching a meteor.



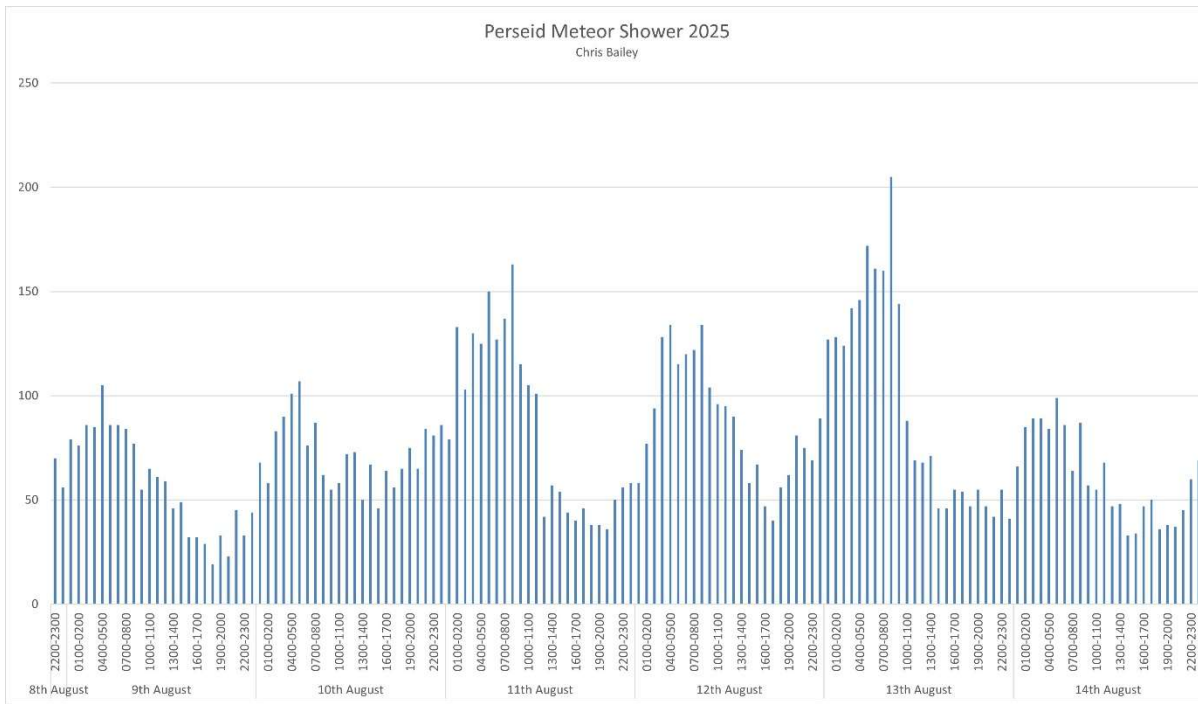
Perseid meteors streak towards Durdle Door in this 2025 image from photographer Josh Dury. (Image credit: Josh Dury)

## Looking Ahead: Cherishing the Cosmic Connection

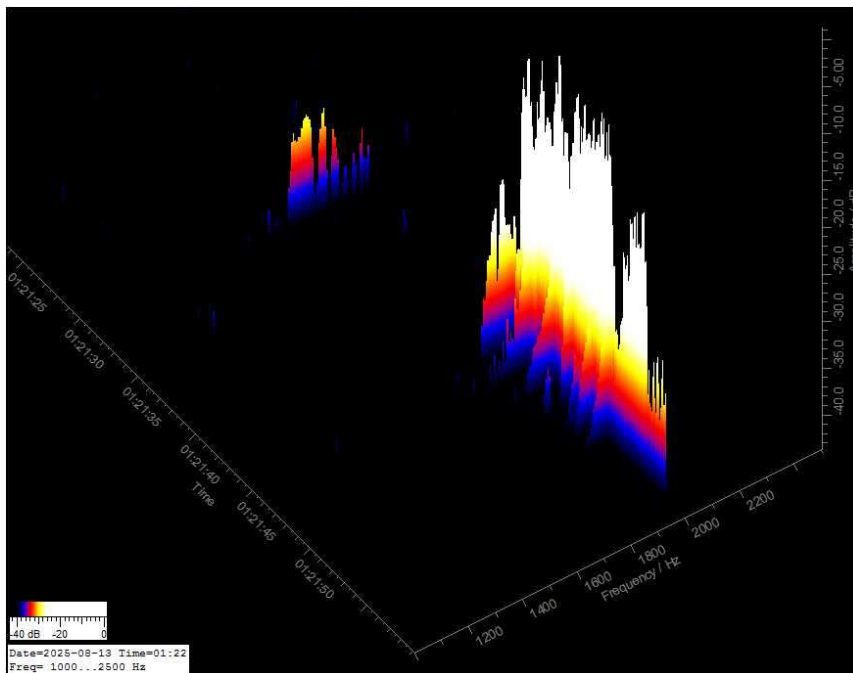
The Perseid meteor shower of 2025 is more than a scientific event—it is a reminder of our place in the universe, a celebration of the beauty and mystery woven into the fabric of the night sky. Whether you are a seasoned astronomer or a casual watcher, the Perseids invite all to step outside, look up, and be moved by a spectacle that has united generations in wonder.

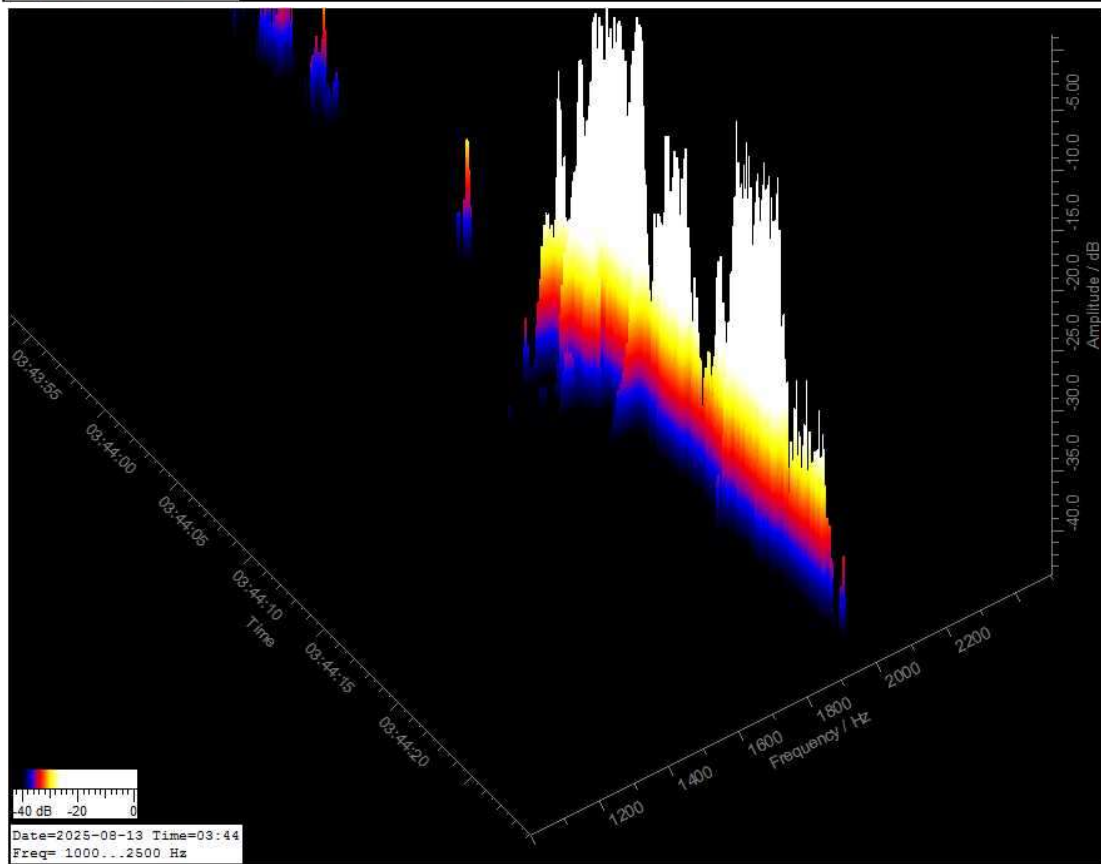
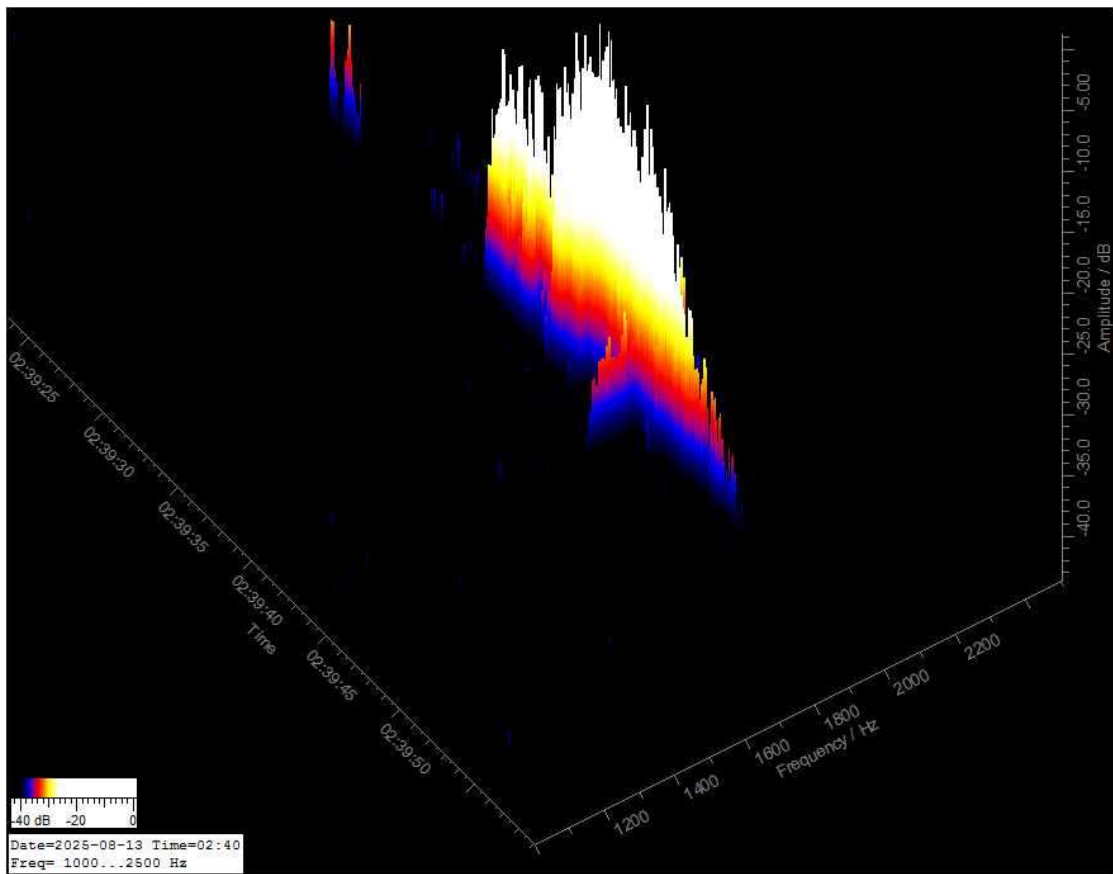
## Radio Observations 2025

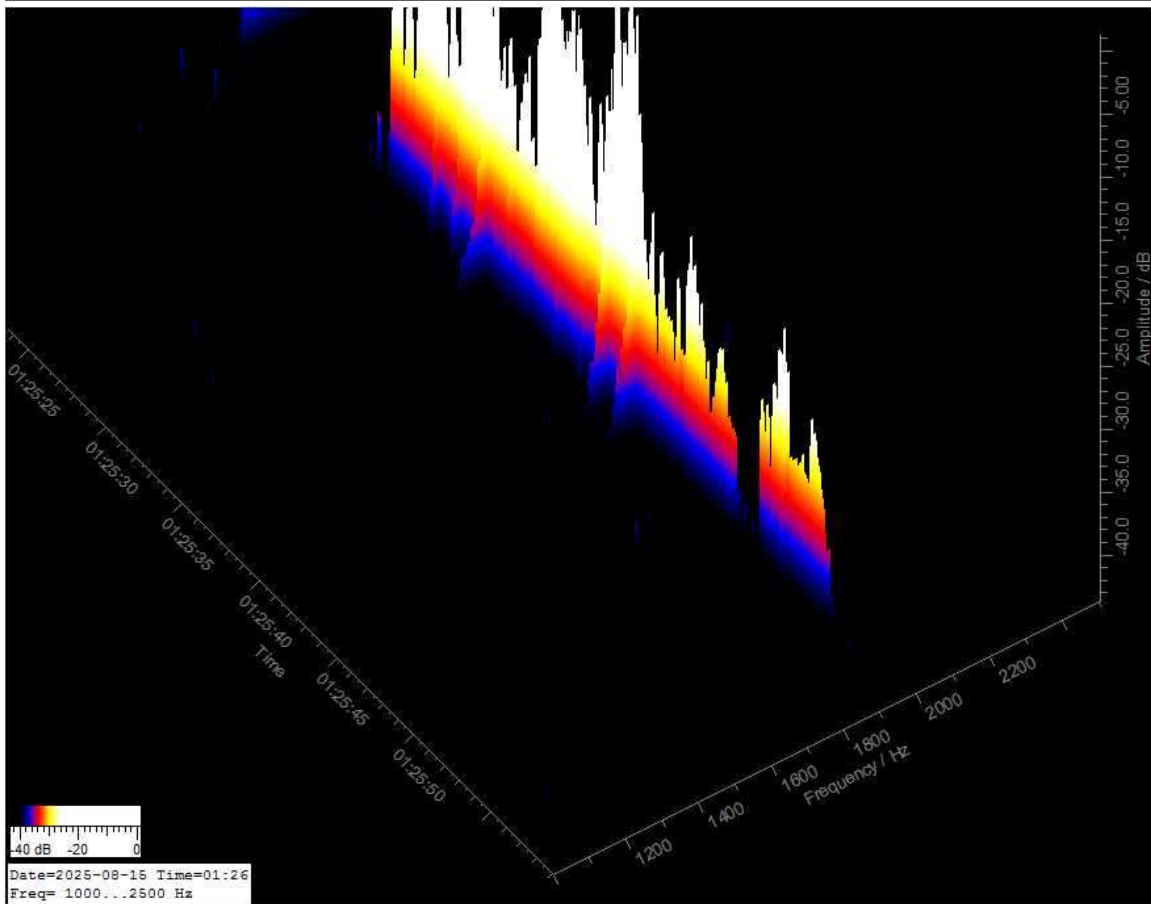
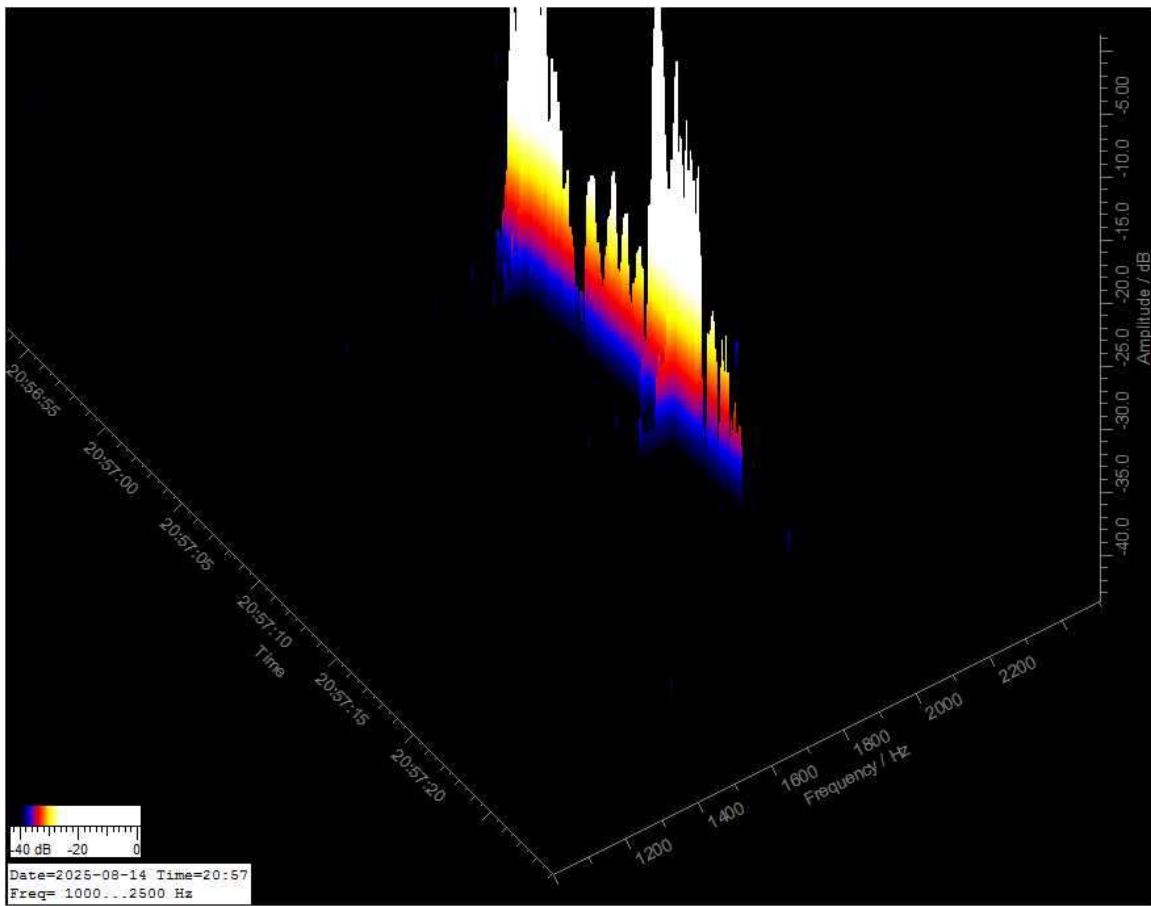
Radio observations using reflected echoes from the GRAVES transmitter near Dijon in France. All hand counted to remove Starlink and other satellite echoes.

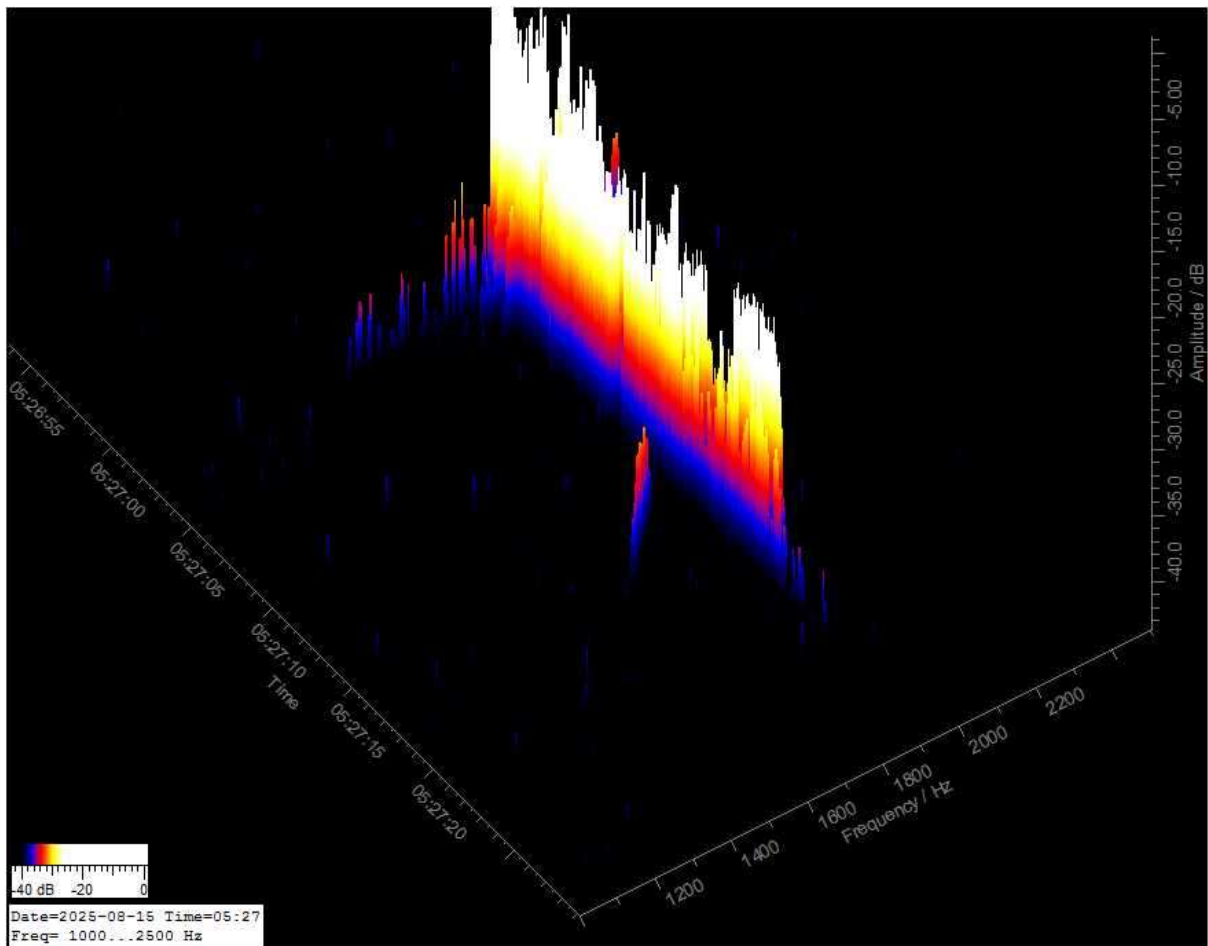


This shows the peak on the 13<sup>th</sup> which is a little later than expected. Another notable observation is that most of the larger echoes were at or after the peak.







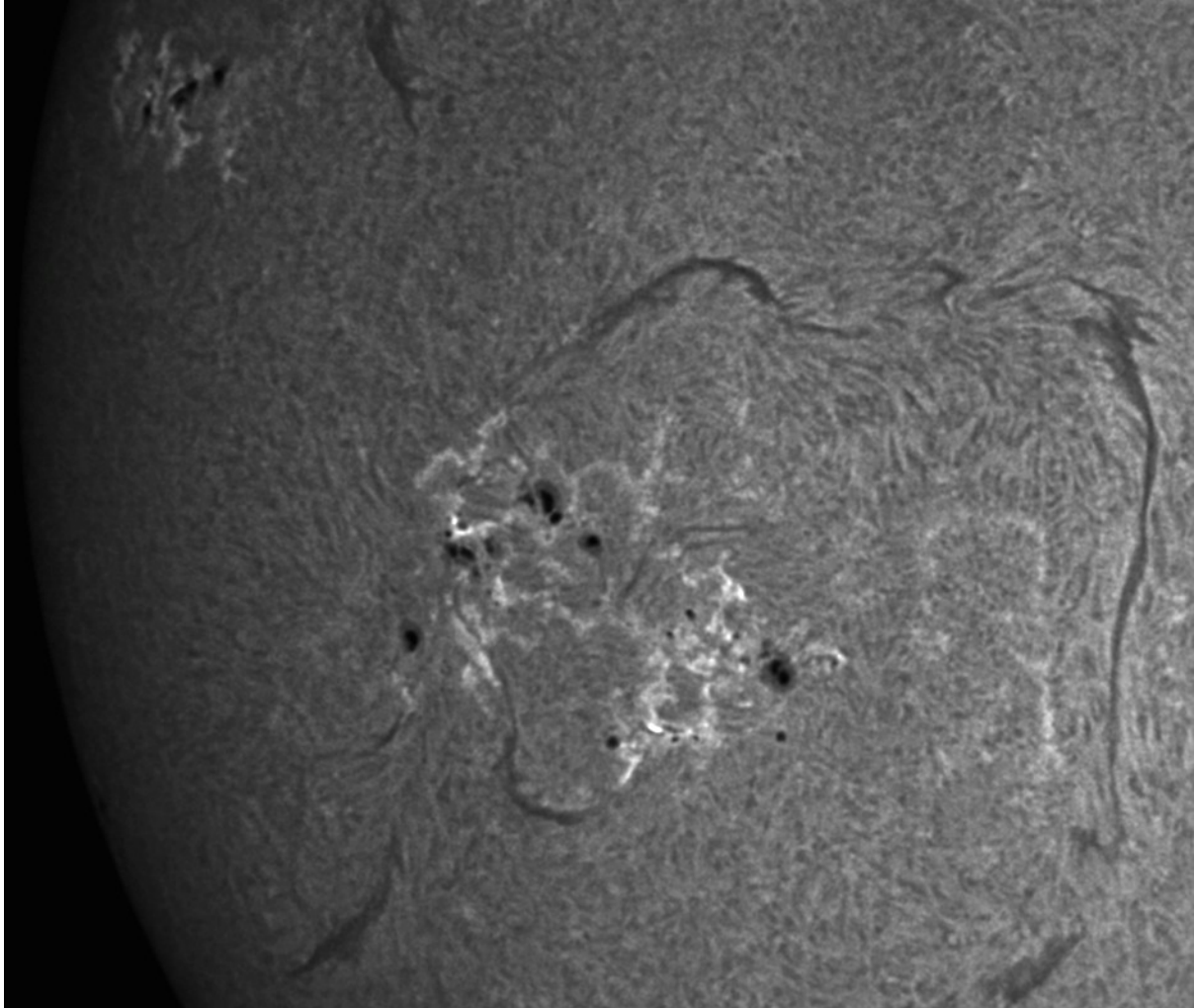


Chris Bailey

# Imaging the Sun in Hydrogen-Alpha ( $H\alpha$ )

## A Journey into Solar Observation

### Revealing the Hidden Dynamics of Our Star



All images by Chris Bailey

The Sun, our closest star, presents a constant spectacle of activity. To the unaided eye, it appears as a featureless, blinding disc, but to those who peer through specialised filters, an entirely different world comes alive—a dynamic tapestry of prominences, filaments, plages, and sunspots. Among the most captivating and informative ways to observe and photograph the Sun is through the use of Hydrogen-alpha ( $H\alpha$ ) light. This narrow band of the electromagnetic spectrum reveals the Sun in breathtaking detail, unveiling secrets inaccessible by other means.

### What is Hydrogen-Alpha ( $H\alpha$ )?

Hydrogen-alpha, often abbreviated as  $H\alpha$ , refers to a specific wavelength of light emitted by hydrogen atoms when an electron transitions from the third to the second principal energy level. This transition produces light at a wavelength of 656.28 nanometres (nm), which falls within the red portion of the visible spectrum.

The Sun's atmosphere, particularly the chromosphere, is rich with hydrogen. The  $H\alpha$  line is thus a vital window through which astronomers can study solar phenomena occurring in this layer. By isolating this narrow slice of light, astronomers can observe spectacular features and dynamic events hidden from view in white light.

## Why Image the Sun in H $\alpha$ ?

Imaging the Sun in H $\alpha$  offers a radically different perspective from traditional white-light observation. While sunspots—the dark, cooler regions on the solar surface—are visible in white light, H $\alpha$  imaging reveals a plethora of additional features:

- **Prominences:** Towering loops and arches of plasma that extend from the Sun's limb, often hundreds of thousands of kilometres in size.
- **Filaments:** Dark, thread-like structures seen against the solar disc; in fact, these are prominences viewed from above.
- **Plages:** Bright patches that surround sunspots, marking regions of intense magnetic activity.
- **Flares:** Sudden eruptions of energy and material that can dramatically alter the appearance of the chromosphere.
- **Spicules:** Small, short-lived jets of gas that pepper the chromosphere.

Each of these features plays a crucial role in understanding solar dynamics and, by extension, our broader knowledge of stellar physics and space weather.

## The Science and Technology Behind H $\alpha$ Imaging

Imaging the Sun in H $\alpha$  is no simple feat. The Sun emits an overwhelming amount of light across the spectrum, and isolating a single wavelength requires precision and advanced technology.

### Narrowband Filters

The cornerstone of H $\alpha$  imaging is the narrowband filter. These filters allow only a tiny fraction of the spectrum—centred precisely at 656.28 nm—to pass through, blocking all other wavelengths. The two most common types are:

- **Etalon Filters:** These use interference between parallel glass plates to allow only a very specific wavelength of light through. The quality and uniformity of the plates determine the sharpness and clarity of the image.
- **Fabry–Pérot Interferometers:** Similar in principle to Etalon filters, but often more complex and adjustable, allowing observers to "tune" into slightly different portions of the H $\alpha$  line for enhanced contrast or to view Doppler-shifted phenomena.

The "bandpass" of these filters is commonly measured in Angstroms (Å) or nanometres (nm). A narrower bandpass (e.g., 0.7Å or less) yields higher contrast and more detailed views but is more expensive.

### Telescopes

Not all telescopes are suitable for solar observation. Standard telescopes, if used without the appropriate filters, can cause irreversible eye damage or destroy imaging equipment. Dedicated solar telescopes, such as those produced by Lunt Solar Systems or Coronado, are equipped with integrated H $\alpha$  filters and energy rejection systems, making them both safe and effective for viewing and capturing the Sun in this unique wavelength.



Lunt 80mm double stacked Ha modular telescope. Rotating the Etalons reduces reflected light.

## Imaging Equipment

Modern solar imagers typically use high-speed monochrome cameras to capture the faint, fast-changing structures in the chromosphere. These cameras are often paired with computers running sophisticated stacking and processing software, allowing astronomers to produce images of stunning clarity and detail.



Daystar Quark filter on William Optics 110mm telescope making an effective F28 system

## Techniques for Imaging the Sun in H $\alpha$

Successful H $\alpha$  imaging involves more than just pointing a telescope at the Sun and snapping a photo. The Sun's features are constantly evolving, and atmospheric turbulence can blur fine details. Here are some key techniques and considerations:

### Safety First

Never attempt solar observation without certified solar filters. Permanent eye damage or blindness can occur in milliseconds. Always double-check that your equipment is properly configured before aiming at the Sun.

## Achieving Focus and Contrast

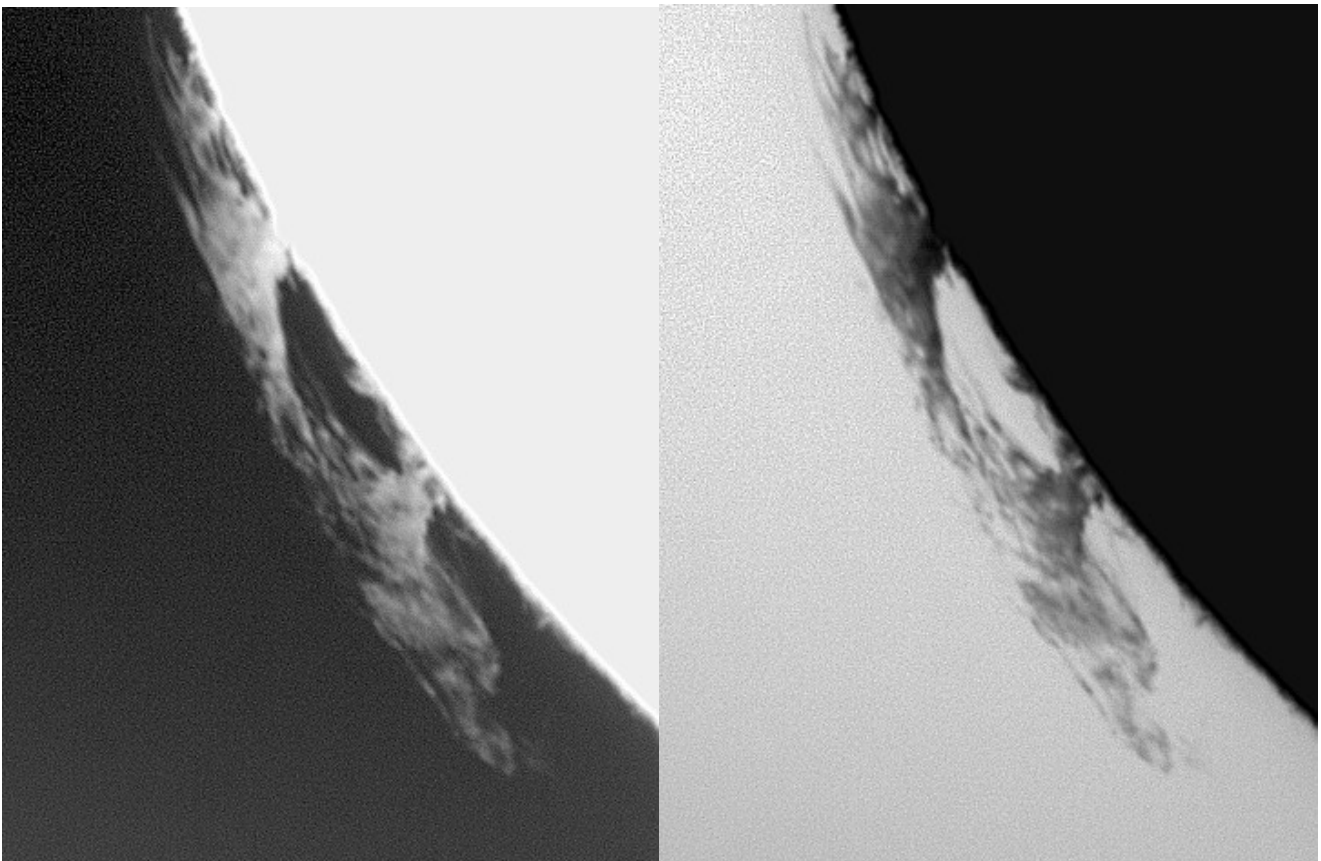
Focusing is especially challenging in H $\alpha$  due to the monochromatic nature of the light. Live-focus using high frame-rate cameras or automated focusing systems is often necessary. Adjusting the filter's tuning (if available) can help enhance contrast for specific features, such as prominences or filaments.

## Exposure and Gain

Solar features in H $\alpha$  can vary widely in brightness. Short exposures are necessary to avoid overexposing brighter areas like plages, while faint prominences may require higher gain or longer exposures. Many imagers take multiple images at different settings and combine them in post-processing.

## Image Stacking and Processing

Atmospheric turbulence (or "seeing") blurs images, even with the best equipment. To overcome this, imagers record video sequences—sometimes thousands of frames long—then use software to align and stack only the sharpest frames, reducing noise and enhancing detail. Programmes like Autostakkert! and RegiStax are popular choices for this task.

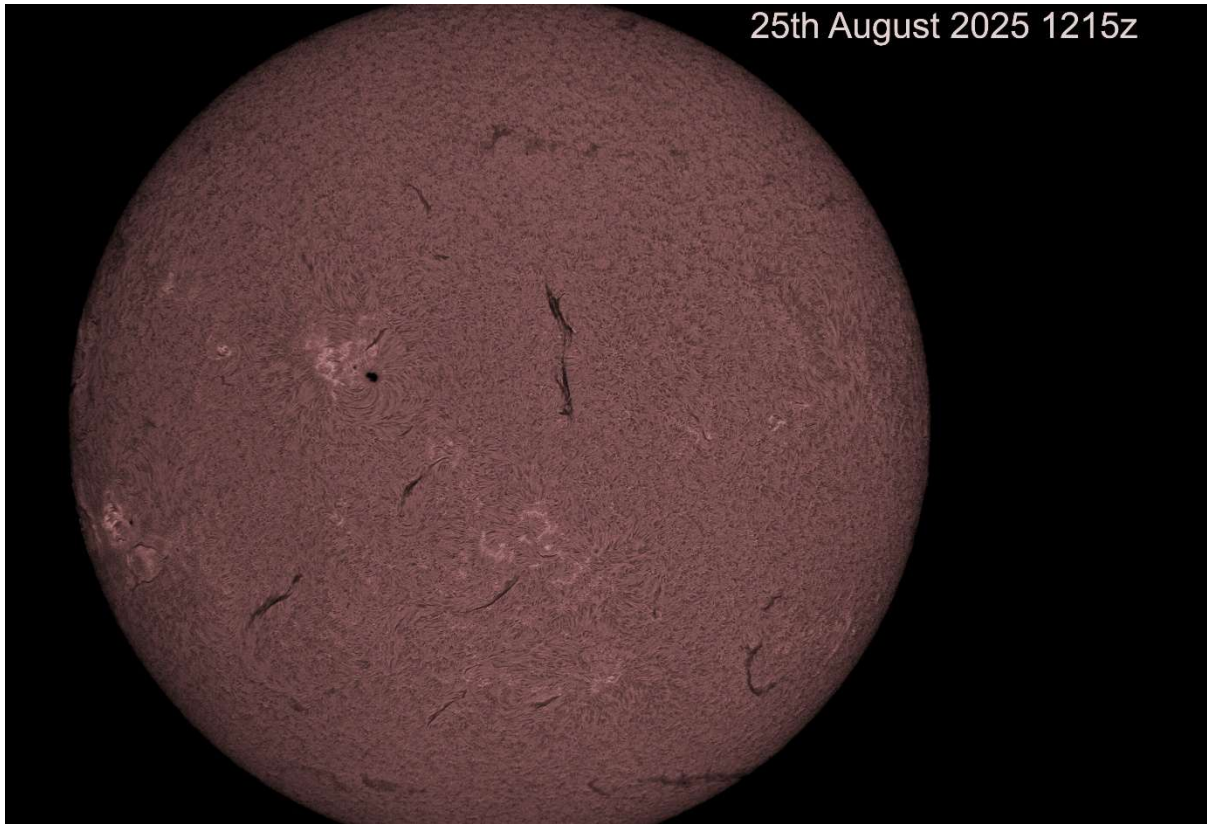


Normal Image

Inverted image

## Colour Mapping

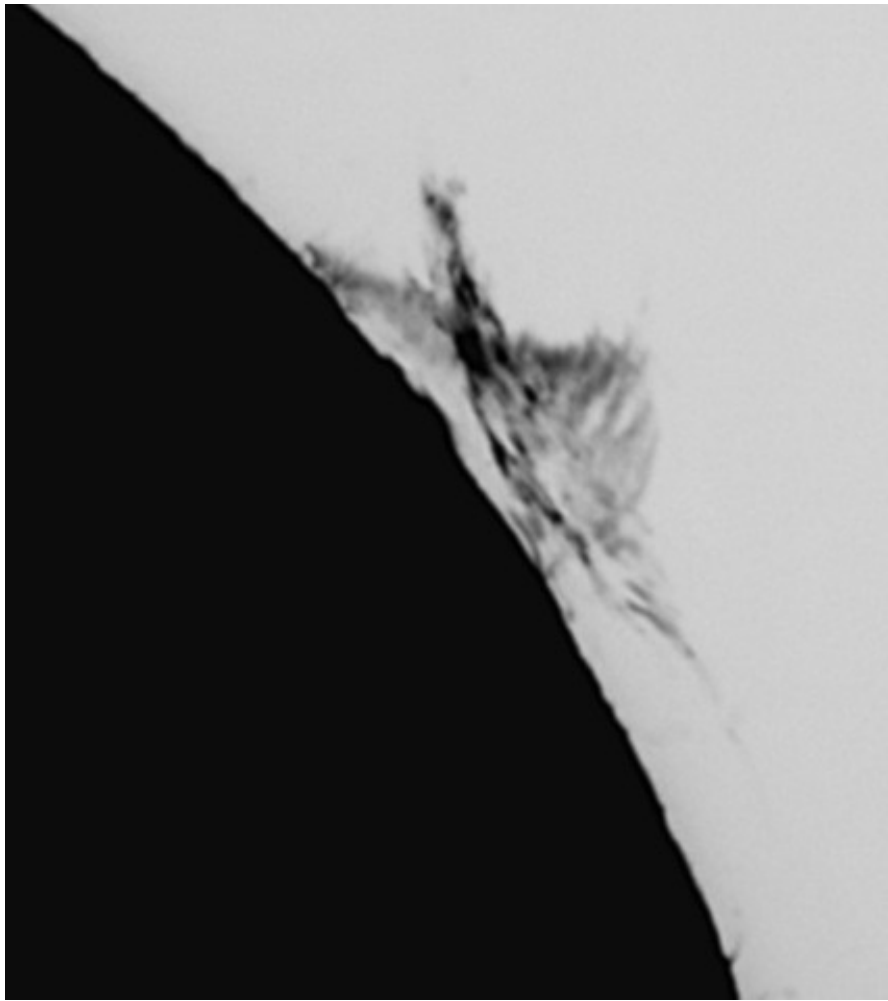
Though H $\alpha$  images are natively monochrome (red channel), many imagers "false-colour" their photos to add visual interest and highlight features. This may involve mapping brightness to shades of orange, gold, or even blue for artistic and educational effect.



## What Can We Learn from H $\alpha$ Solar Imaging?

Observing the Sun in H $\alpha$  provides essential insights into solar activity, magnetism, and dynamics. Here are some scientific advancements made possible through H $\alpha$  imaging:

- **Solar Flares and Space Weather:** H $\alpha$  imaging allows astronomers to monitor the build-up and eruption of flares, which can affect satellite communications, power grids, and even airline routes on Earth.
- **Magnetic Field Mapping:** The structures visible in H $\alpha$  often trace the Sun's complex magnetic field. By monitoring their movement, scientists can infer how magnetic energy is stored and released.
- **Plasma Physics:** Observing prominences and filaments helps researchers study plasma behaviour in environments difficult to replicate on Earth.
- **Long-Term Solar Cycles:** Continuous H $\alpha$  monitoring has revealed the cyclical nature of solar activity, crucial for understanding climate dynamics and predicting future solar behaviour.



## Amateur Involvement and Outreach

While professional observatories contribute valuable data, amateur astronomers play an increasingly vital role in H $\alpha$  solar imaging. High-quality, affordable equipment has democratized solar observation, enabling enthusiasts to contribute imagery and data to worldwide networks and organisations.

Online communities share daily images, timelapse videos, and alerts for major solar events. Educational programmes use H $\alpha$  telescopes to introduce students to real-time astronomy, fostering public interest and scientific literacy.

## Challenges and Limitations

Despite the allure of H $\alpha$  imaging, several challenges persist:

- **Cost:** High-quality H $\alpha$  filters and telescopes are expensive, limiting access for many enthusiasts.
- **Atmospheric Seeing:** The Earth's atmosphere often blurs or distorts fine details, especially during daytime heating.
- **Safety Concerns:** Improper use of equipment can result in serious injury.
- **Weather Dependency:** Cloud cover and poor weather can severely limit observing opportunities.

## The Future of H $\alpha$ Solar Imaging

Advancements in filter technology, camera sensitivity, and adaptive optics promise even more detailed and dynamic views of the Sun in H $\alpha$ . Space-based solar observatories—free from the constraints of Earth's atmosphere—are already providing continuous, high-resolution images that deepen our understanding of solar phenomena.

The merging of amateur and professional efforts, alongside public outreach, ensures H $\alpha$  solar imaging will remain at the forefront of astronomical discovery. Every observation brings us a step closer to decoding the mysteries of our life-giving star.

## Conclusion

Imaging the Sun in Hydrogen-alpha is not simply a technical pursuit; it is a portal into a hidden universe of energy, motion, and beauty. It transforms our perception of the familiar Sun, revealing a world in perpetual upheaval. Whether for science, art, or education, the practice continues to inspire and connect us to the grand rhythms of the cosmos.

# Pro-Am Working Group

## Calling all Amateur Astronomers,

As you may recall, last year, you completed a survey expressing interest in collaborating with professional astronomers from the International Astronomical Union (IAU) on various research efforts. The newly launched IAU Pro-Am Research Collaboration (PARC) initiative promotes and facilitates research initiatives between amateur and professional astronomers. We invite amateur astronomers from around the world to visit the PARC web portal, explore the “Active Projects”, and sign up to participate in those that are of interest to you.

PARC Web Portal LINK - [https://www.iau.org/science/scientific\\_bodies/working\\_groups/professional-amateur/](https://www.iau.org/science/scientific_bodies/working_groups/professional-amateur/)

Please note that new projects will be added as they are proposed by professional astronomers and approved, so be sure to visit the PARC web portal regularly to explore new opportunities.

In addition to these research opportunities, the first PARC workshop will take place in person in Mumbai, India, December 1-3, 2023. This is a great opportunity for amateurs to learn about new projects, tools and techniques, and to meet other amateurs and professionals interested in research collaborations. Please visit the link below for more information and to register for the meeting.

PARC Meeting LINK: <https://khagolmandal.com/ProAm2023.html>

Thank you so very much for your time and consideration, and please share this invitation with others who may be interested. We are looking forward to your participation! If you have any questions, please direct them to Tim Spuck at [tspuck@ui.edu](mailto:tspuck@ui.edu) or Aniket Sule at [aniket.sule@gmail.com](mailto:aniket.sule@gmail.com).

Best wishes,

Tim Spuck, Pro-Am Working Group Co-Chair  
Aniket Sule, Pro-Am Working Group Co-Chair

# Members Astro-photographs.

Dan Self



NGC7331 ft 12<sup>th</sup> Magnitude supernova nr nucleus



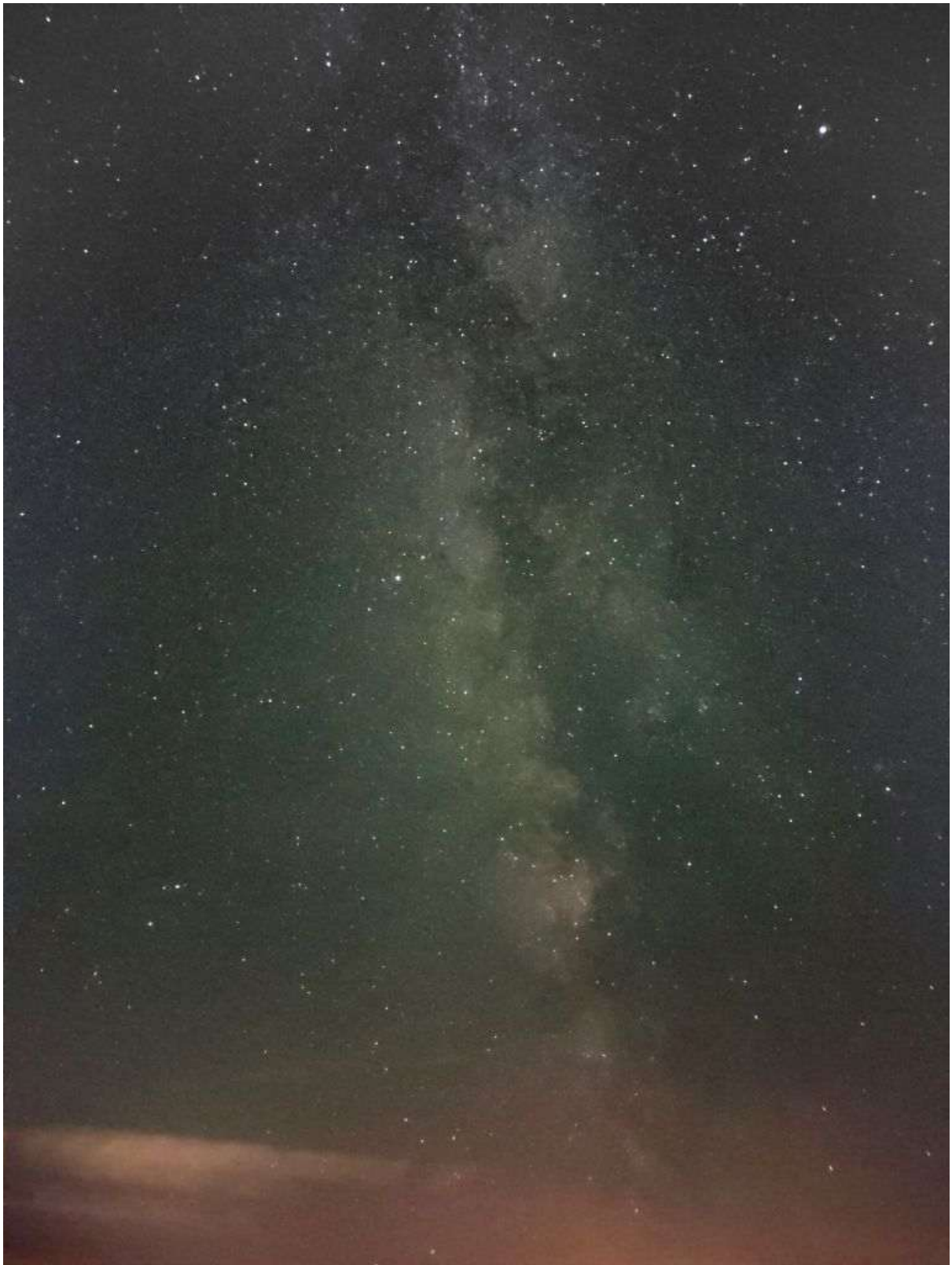
June 28<sup>th</sup> 11pm Notilucent clouds North of Norwich.



Sharpless2-106 Challenging object in cygnus near M29



Sharpless2-90 faint diffuse red nebula Vulpecula

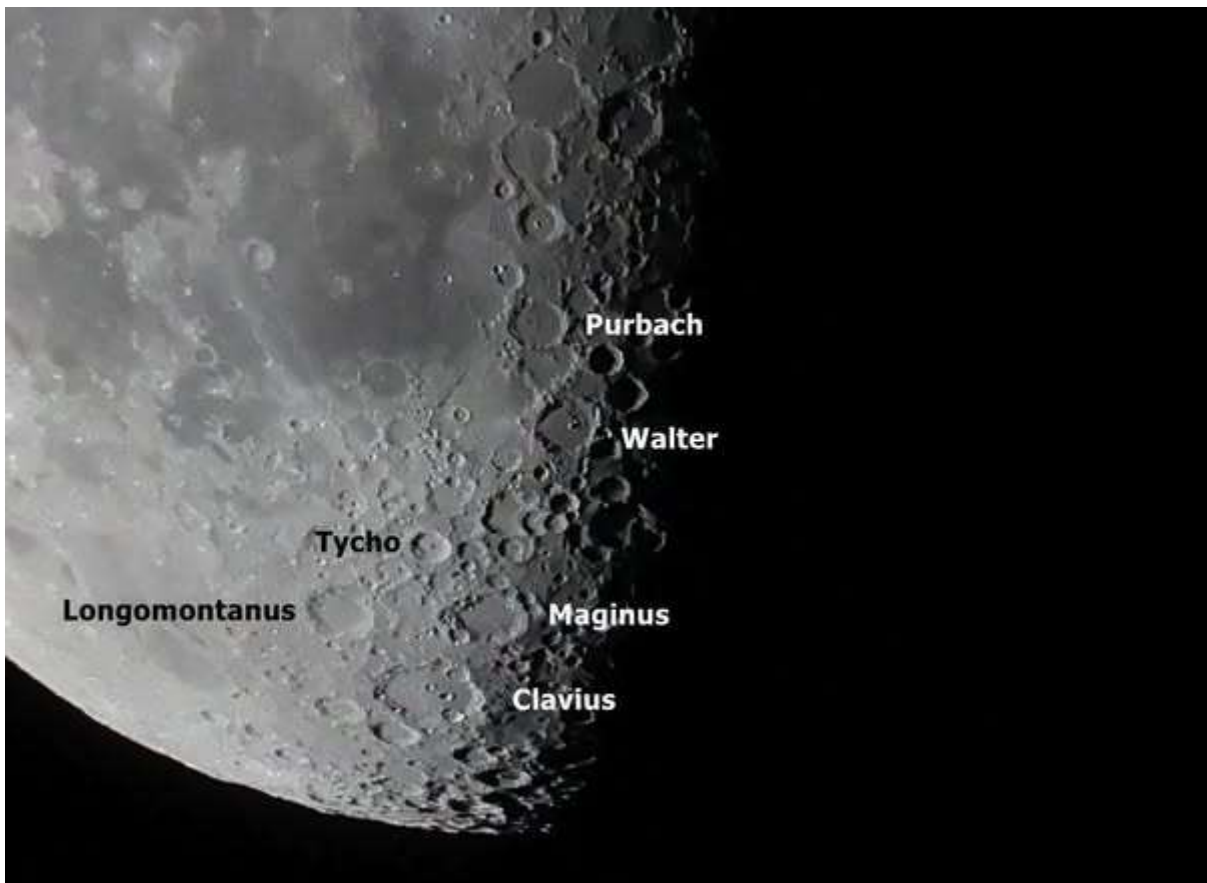


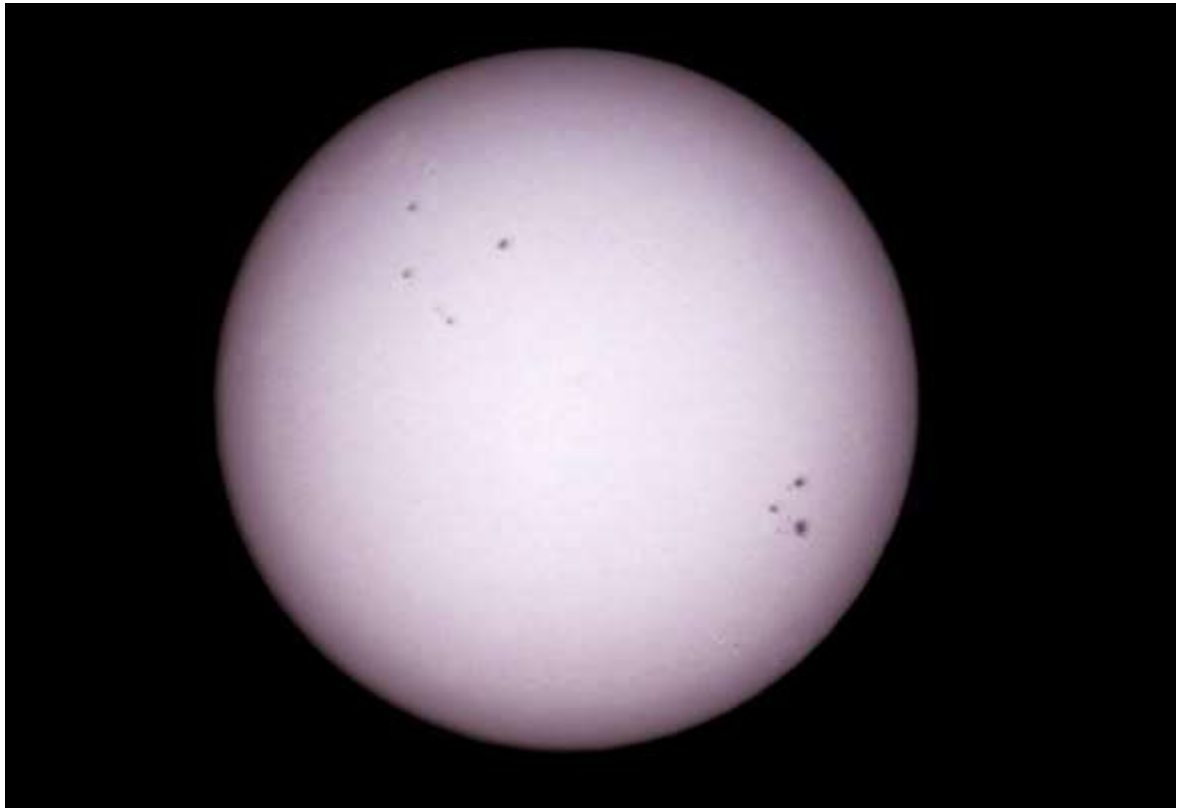
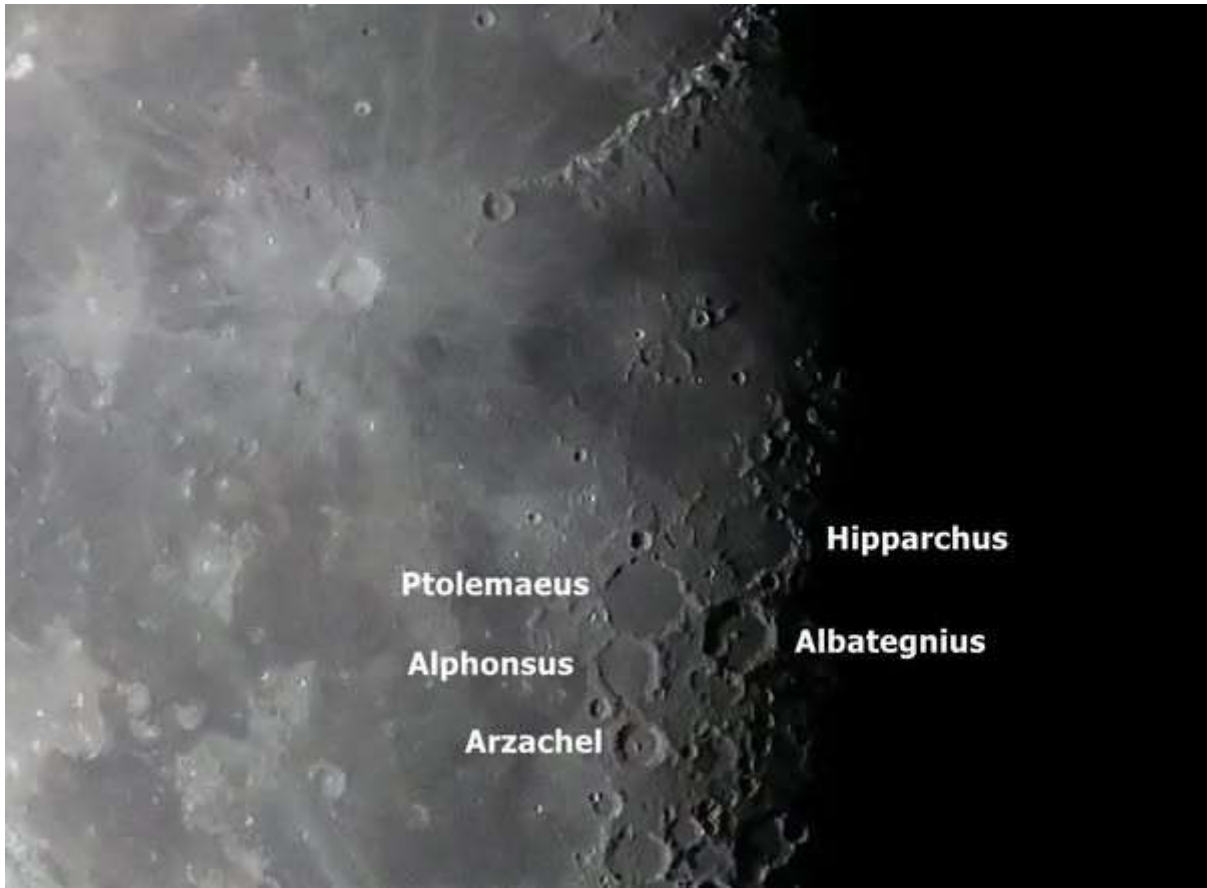
Phone from observatory late evening 5X10s stacked in Sequator

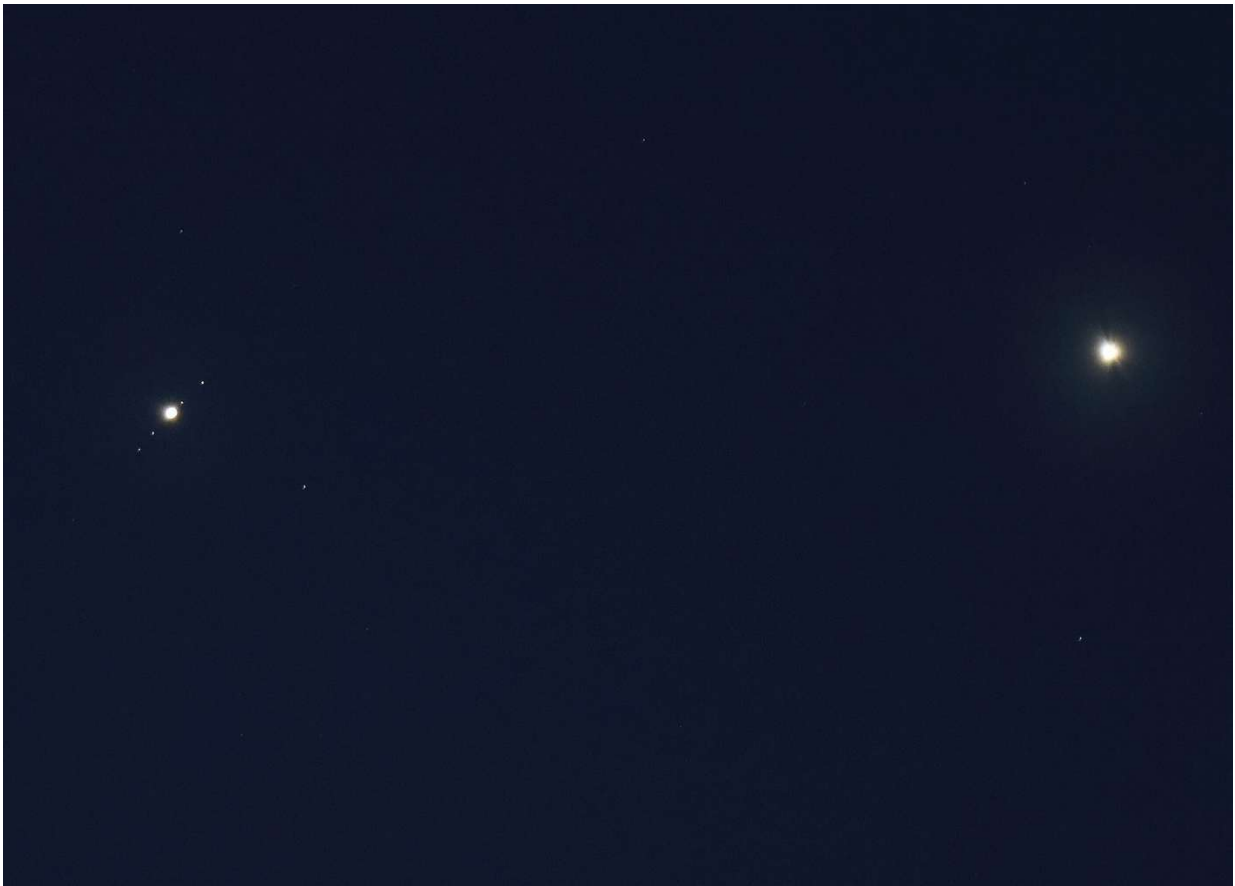
David Bryant











Venus and Jupiter conjunction: all four Galilean moons of Jupiter



Neptune, the outermost planet of the Solar System.

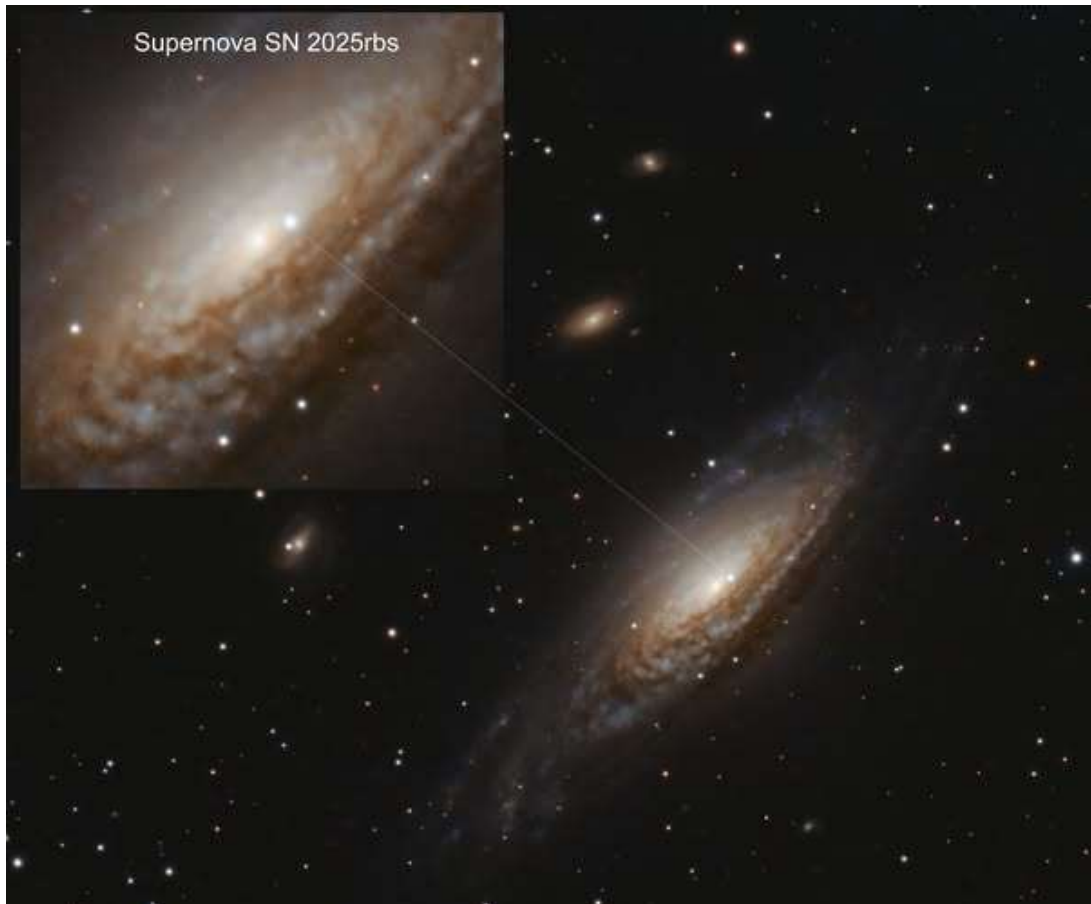


Moon, Jupiter, Venus and Mercury close together in the dawn sky.

Roger Hyman



Andy Weller



NGC 7331 The supernova has been poetically named "SN 2025rbs"

Pat Goddard

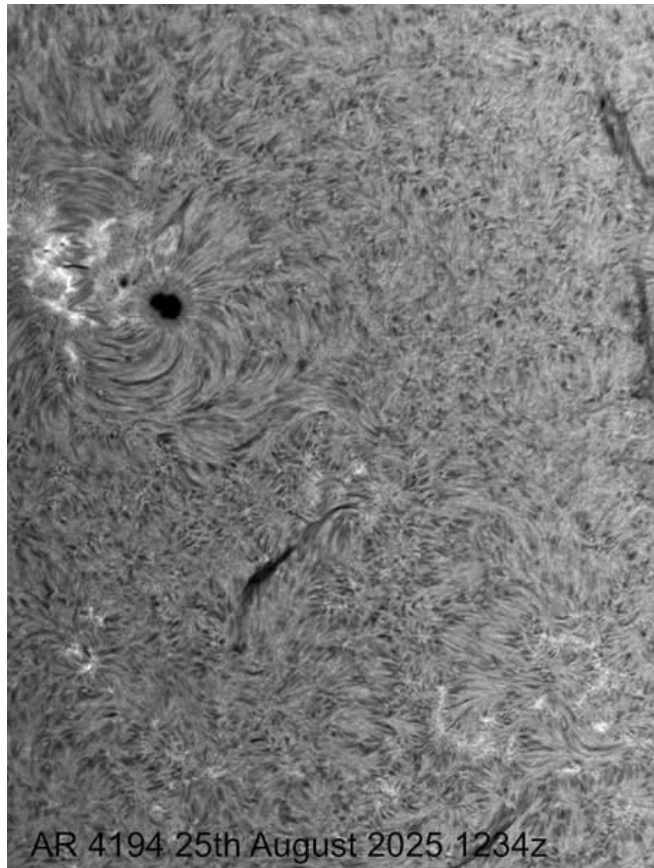


Nikon P1100 Bridge Camera.  
Manfrotto 190CXPRO4 Tripod  
ZWO TH10 Tripod Head.

Mick Ladner



Chris Bailey



# Astronomy General Knowledge Quiz!

## Answers:

1	<b>Butterfly diagram</b>
2	<b>Reticle</b>
3	<b>Eris - It is just over 2,300km in diameter.</b>
4	<b>Capella</b>
5	<b>Kelvin – the thermodynamic temperature scale as proposed by Lord Kelvin</b>
6	<b>Local Arm, it is the galactic arm in which our Sun resides.</b>
7	<b>Astrograph</b>
8	<b>Nautical Almanac – first published by Nevil Maskelyne, the 5<sup>th</sup> Astronomer Royal</b>
9	<b>Deep-sky objects</b>
10	<b>Antennae – a pair of interacting galaxies which have long, faint, curved tails which gives them their name.</b>
11	<b>Southern Lights</b>
12	<b>Tesla</b>
13	<b>Rosse, Third Earl of (William Parsons) built the 72” at Birr Castle in Ireland.</b>
14	<b>Orbit.</b>
15	<b>BRECKLAND ASTRO</b>

## **For Sale or Wanted**

This section is for the sale of Astronomical items and any wants from members. Details of items for sale (With photographs where applicable) should be forwarded to the newsletter editor at [newsletter@brecklandastro.org.uk](mailto:newsletter@brecklandastro.org.uk)

It is suggested that a donation of 5% of the final sale price be given to the Society to assist with funds. If sellers do not wish to make their contact details public then please make this known to me and I will field any enquiries on a box number system. Please send any sales details to me before the 26<sup>th</sup> of the month for inclusion in the next issue.

Please ensure that if any item is sold by another means prior to publication that I am advised so it can be removed to avoid confusion.

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I wish to dispose of the astronomical equipment that I've had for some time now. The list is below.

1/ Solar observatory, comprising 150mm f/8 paraboloid, 2 x 150mm flat mirrors in heliostat with fixed speed 240 volt drive, diagonal flat and drawtube & eyepiece, CaK PST with video camera and screen, all on a steel frame/stand.

2/ Celestron 8" SCT, 240 volt fixed speed, in box with tripod, equatorial mount. 90 degree drawtube.

3/ Broadhurst-Clarkson 2.5" refractor, extension tube, tripod in box.

4/ 900mm x 60mm refractor set up on stand for window viewing via 100 x 100 heliostat, filter holder, 240 volt fixed speed drive.

5/ 900 x 60 mm Zennox refractor with equatorial mount on tripod, 90 degree eyepiece.

6/

7/ Celestron 60mm refractor with white light solar filter.

8/

9/ Coronado Ha PST

10/ Home made 75mm safe to use solar viewer,

11/

12/ Baader 9" white light solar filter.

13/ five 100mm flat mirrors.

14/ 150mm flat mirror on stand with another 150mm mirror.

15/ Taylor-Hobson 8" TV lens with iris.

16/ light duty, simple tripod.

17/ 150mm stainless steel flat mirror.

18/ 50mm x 50mm glass optical grating, high quality.

19/ set of drawers containing various optical items.

20/ twin oscillating slit unit with 240 volt drive.

If anyone is interested in any of the items please email [newsletter@brecklandsastro.org.uk](mailto:newsletter@brecklandsastro.org.uk) and we can arrange for them to collect them.

They can make me an offer. I live in Eaton, Norwich NR4.

Brian Mitchell



# BRECKLAND ASTRONOMICAL SOCIETY

Charity No.1044478

[www.brecklandastro.org.uk](http://www.brecklandastro.org.uk)

Affiliated to the British Astronomical Association and the Federation of Astronomical Societies

Dr Dan Self, Chairman, 56 Lindley Street, Norwich, Norfolk, NR1 2HF.

07734 364667 [chairman@brecklandastro.org.uk](mailto:chairman@brecklandastro.org.uk)

## OBSERVATORY RISK ASSESSMENT 2025

This policy document applies to the aforementioned charity and covers all instances of normal use of the observatory building and equipment within it. All other statements of intent are laid out in the society's constitution.

The purpose of the society (Breckland Astronomical Society) is to promote and to advance public education in the Science of Astronomy and all branches of scientific research and in so doing the following policy statements are necessary.

Persons visiting are members and public of all ages by pre-arrangement, or on public open nights.


### Section 2 - Risk Assessment

<b>Hazards</b> <i>(The visit leader must identify any additional hazards relevant to the planned activity where applicable)</i>	<b>Risk Control Measures</b>	<b>Outcome risk rating</b>
<b>For external parties:</b> Safety whilst travelling to observatory.	Responsibility is with individual regarding transport.	Low

Lost people	A nominal roll should be available for parties with minors. Stay in groups and count in and out, especially risky when young children running around on dark field. Responsibility with teachers/akelas.	Tolerable
Pre-existing medical conditions	Visitors are asked to bring with them anything they need with regard to medicine/ first aid training. DS is first aid trained as part of job.	Tolerable
<b>In the Observatory:</b> Moving the telescope dome - Mechanical hazard from cogs and metal clips on dome motors and sliding parts. Falling from dome.	Supervision is necessary to prevent visitors' fingers being caught in dangerous places before moving. Train supervisors. Gears are located in inaccessible places. Signs to keep head out of opening while moving it. Failure of clips holding very difficult due to strong fastening.	Tolerable  Tolerable
Electrical hazards	All electrical circuits are protected by RCD trip switches, which have been checked. Equipment should only be used by trained demonstrators as PAT testing is not viable.	Tolerable
Light intensity from laser pointer, bright LEDs	A low power class 2 laser can be used to collimate scope, this should not be used during visits. An upper end- class 2 green laser is sometimes used for pointing out stars outside. This should NOT be pointed near people, or planes, only switched on briefly and used by supervisors/demonstrators only.	Low
Skin contact with dangerous chemicals	Fly spray, propanol, and cleaning fluid kept in cupboard in small quantities. Keep cupboards shut when visitors are present and supervise.	Tolerable
Standing in dome - Falling (height is 7 feet)	Shutter opening is guarded by 2 bars at child / adult heights. Limit numbers in dome 7 + supervisors can easily fit.	Tolerable
Standing in dark places - Stumbling in low light	Use dim red lights on floor to preserve night vision. Dim lights gradually. We now have luminous tape in place.	Low
Climbing ladder in dark - Falling while viewing through telescope.	Ladder must be shown to people first, but enough light is available. Check for mobility difficulties. Supervision necessary.	Tolerable
Ascending stairs - Falling or being hit with trap door	Be sure demonstrator to go up first and lock door open. A knocking procedure is known if the door is shut.	Tolerable
Fire risk	Large items are not flammable. Mainly metal fixtures and fittings. Sources of ignition (sparks) are contained in electrical equipment. Flammable gases are not kept in building. Radio linked smoke alarms installed. Fire extinguishers available and annually checked. Call 999 in emergency. Can exit via dome opening in emergency.	Tolerable
Standing in dark cold field - frostbite	Weather could be freezing at this time of year. Warm clothes have been advised before trip. Heaters indoors if cold and keep a blanket at the observatory.  Trip hazard in dark. Torch guidance will be provided but is limited because of dark sky observing.	Tolerable

Child protection risks (under 18s)	Two adults should be available at all times. DBS checks are in place for DS and MH but this is not transferable. Breckland Astronomical Society operates a child protection policy. The committee are vigilant with regard to risks. Advise for group leaders to be DBS checked.	Low
Virus transmission	This is at own risk and applies in any public place. There is good ventilation at the observatory, although space can be tight.	Low
Reporting	Sign in for track and trace purposes not needed now, but good to keep records. GDPR applies and it is not necessary to sign.	N/A

Trustees as of 22/04/2025 are: Dr Dan Self <sup>\*\*</sup>(Chairman), Keith Fowler (Treasurer), John Copey (Secretary), Richard Harmon, Mark Humphys, Justin Pearson. Trusted supervising members: Keith Morris, Mick Ladner, Peter Farmer, Chris Bailey, Pat Goddard, Gerald North, Andrew Luck. \*DBS checked for day job. <sup>†</sup>First Aid trained for day job.

Signed..........

Chairman, Breckland Astronomical Society, UKCC 1044478.

## Equipment available for loan to Members

As well as our fantastic library members of the society can borrow our equipment. Here is an equipment list that can be used or borrowed by members, subject to personal responsibility for replacement value. Discuss your plans with one of the regulars first, as it is not easy for beginners to use some of this kit. We are here to help show you how to use it, when the weather holds up, then you will need to sign it out and get approval by a member of the committee. We can discuss a reasonable term.

### Refractors:

William Optics Megrez 102 S.V. F7 D102mm f/7 and reducer to f/5.6 – this may be unavailable soon.  
William Optics GT-102 2019 D102mm F703mm f/6.9  
Vixen 4" Refractor f/9

### SCT/Maks:

Celestron C925 Starbright F10 SCT FL D234.95mm F2350mm f/10 Refractor – preferably this should not be taken off the premises.

Celestron C8 SCT D203.2mm F2000mm f/10 Refractor (orange tube)

Meade LX200R SCT D203.2mm F2000mm f/10

Konus Motormax-90 Maksutov-Cassegrain 90mm F1200mm f/13 #1795

Meade ETX125 D127mm F1900mm f/15 Maksutov-Cassegrain Reflector

#### **Mak-Newt:**

Skywatcher 190MN DS Pro Maksutov-Newtonian Optical Tube Assembly D190mm F1000mm

### Dobsonians:

Skywatcher Skyliner 200mm F1200mm Dobsonian Reflector

Helios D200mm F1000mm Dobsonian Reflector

8-inch Dobsonian (turquoise tube, hand-made)

### Solarscope:

Coronado Solarmax 40

Meade 8x50mm Guide Scope

### Binoculars:

Vanguard KR-7500 7X50mm Field 7 degrees Binoculars – a little out

Konus #2253 7x50 Field 6.8° Binoculars

Chinon RB Optics 8-20 x 50 HB Zoom Binoculars

Prinzlux 10x50 Binoculars – needs optically cleaning

### Mounts:

Berlebach Planet Tripod with Double Clamps

Orange EQ4 telescope mount

Skywatcher SynScan EQ5 Equatorial Mount & Tripod

SynScan mount controller

Meade LXD German Equatorial Mount & Autostar Controller

SynScan mount controller

iOptron IEQ45 Mount and Pier

iOptron Go2Nova mount controller

## **Eyepieces:**

Tele Vue Delos 17.1mm 2"  
Antares Speers-Waler 4.9mm SWA Series 2 2"  
Antares Speers-Waler 9.4mm SWA Series 3 2"  
Meade Ultra Wide Angle 14mm 1.25/2"  
Antares W70 Series 8.6mm  
Meade Super Wide Angle 18mm 1.25"  
Celestron 32mm Plossl 1.25"  
Celestron 26mm Plossl 1.25"  
Antares 17mm Plossl FMC 1.25"  
Intes-Micro Q74 WA 21mm 1.25"  
Orion (Or) Circle-T 9mm 1.25"  
Vixen K 18mm 1.25"  
Fullerscope K 25mm 1.25"  
66 Ultrawide 20mm Long Eye Relief 1.25"  
Or 6mm 1.25"  
Plossl 40mm Multi-coated  
Plossl 17mm Multi-coated  
14mm (7mm 21mm) 1.25"  
Super 20mm 1.25"  
Soligor PE-6mm 1.25"  
Super Plossl 32mm 1.25"  
Lanthanum LV 2.5mm 45 degree 20mm 1.25"  
Televue 2x Barlow 1.25"  
Televue 2.5x Barlow Powermate 1.25"  
2x Barlow Lens  
Meade Teleneegative 2x Barlow 1.25"

## **Telescope accessories:**

William Optics AFR-IV Adjustable Flattener Reducer  
Meade Zero Image-Shift Microfocuser  
Meade 4000 Series f6.3 Focal Reducer  
Meade 4000 series f3.3 CCD Focal Reducer with T-Adapter  
Celestron Reducer/Corrector f6.3 (Model: 94175)  
Tamron Adaptall-2 Custom Mount

## **Eyepiece accessories and filters:**

Meade Electronic Eyepiece  
Meade Illuminated Reticle MA12mm  
Celestron Radial Guider (#94176)  
Light Pollution Filter 1.25"  
Meade #908 O-III Nebular Filter  
Variable Polarizing Filter #3  
Baader Planetarium Contrast-Booster Filter (#2458360) 1.25"  
Celestron Colored Eyepiece Filters (#25 Red, #38A Blue, #47 Violet, #53 L Green)  
Baader G-CCD Filter 1.25" (Cat: 2458470G)  
Baader R-CCD Filter 1.25" (Cat: 2458470R)  
Baader B-CCD Filter 1.25" (Cat: 2458470B)  
Baader UV/IR Cut/L-Filter 1.25" (Cat: 2459207A)  
Baader H-alpha 7nm CCD Narrowband-Filter 1.25" (Cat: 2458382)  
Baader O-III 8.5nm CCD Narrowband-Filter 1.25" (Cat: 2458435)  
Baader S-II 8nm CCD Narrowband-Filter 1.25" (Cat: 2458430)  
Baader H-beta 8.5nm CCD Narrowband-Filter 1.25" (Cat: 2458425)  
Astronomik L-RGB Type 2c Filterset 1.25" (4 filters, Cat: 10220125)  
Astronomik CLS-Filter 2" (Cat: 10213200)  
Astronomik CLS-Filter 1.25" (Cat: 10213125)

Astronomik CLS CCD-Filter 1.25" (Cat: 10208125)  
Star Analyser 100 (Model: PHEL-SA100) – produces spectra

## **Cameras:**

Atik Focal Reducer 58mm  
Atik 383L + FW 1 1/4"+Filters  
Atik Infinity Camera  
Atik 314L+ CCD Camera (SNI1003041)  
Atik One 6.0 Monochrome CCD Camera (SN: 1191452-0093)  
Atik 460EX Color (SN21223-26)  
ZWO ASI290MM Mini USB 2.0 Monochrome Small Format CMOS Camera  
Imaging Source DBK21AU618.AS 640x480 USB2 planetary camera  
STV ('vintage video CCD AV camera) and Filter Wheel  
Astrovid 2000 ('vintage' CCD camera)  
Nikon D100 DSLR  
Sigma EX DG Macro 105mm 1:2.8 DLSR Lens  
Geoptik CCD Adapter x Canon (Model: 30A189)

## CONTACTS

**Chair** Dan Self  
**Contact** [chairman@brecklandastro.org.uk](mailto:chairman@brecklandastro.org.uk)

**Observatory/Visits** Mick Ladner  
**Contact** [visitors@brecklandastro.org.uk](mailto:visitors@brecklandastro.org.uk)

**Webmaster** Andrew Luck (temporary)  
**Contact** [webmaster@brecklandastro.org.uk](mailto:webmaster@brecklandastro.org.uk)

**Newsletter** Chris Bailey  
**Contact** [newsletter@brecklandastro.org.uk](mailto:newsletter@brecklandastro.org.uk)

**Membership/Treasurer** Keith Fowler  
**Contact** [treasurer@brecklandastro.org.uk](mailto:treasurer@brecklandastro.org.uk)

**Secretary** John Copsey  
**Contact** [secretary@brecklandastro.org.uk](mailto:secretary@brecklandastro.org.uk)

**Please check with any of the contacts in bold before visiting the observatory. Please ensure you are wearing appropriate footwear and clothing and bring a torch (preferably one showing a RED light)**

## Breckland Astronomical Society Events – 2025-6

7:30pm Great Ellingham Recreation Centre, Watton Road, Great Ellingham, Attleborough, Norfolk

between NR17 1HZ and 1HX    £3 over 18s    *what3words:octopus.vibrates.hubcaps*

Friday, August 29 <sup>th</sup>	<b>Public Open Evening, first of season</b>	Observatory
Friday September 12 <sup>th</sup>	<b>Messier and Messier</b>	Dr Dan Self, BAS
Friday September 26 <sup>th</sup>	<b>Public Open Evening</b>	Observatory
Friday October 10 <sup>th</sup>	<b>Black Hole Collisions, Gravitational Waves &amp; Supermassive Black Holes</b>	Stephanie Buttigieg PhD University of Cambridge
Friday October 31 <sup>st</sup> Halloween	<b>Public Open Evening</b>	Observatory
Friday November 14 <sup>th</sup>	<b>Kuiper Belts around Other Stars</b>	Dr Tim Pearce, Stephen Hawking Fellow, University of Warwick
Friday November 21 <sup>st</sup>	<b>BAS Christmas Meal at the Crown</b>	Great Ellingham
Friday November 28 <sup>th</sup>	<b>Public Open Evening</b>	Observatory
Friday December 13 <sup>th</sup>	<b>Planetary Nebulae</b>	Keith Fowler, BAS
Friday December 26 <sup>th</sup> Boxing Day	<b>Public Open Evening</b>	Observatory
...		
Friday March 13 <sup>th</sup>	<b>Magnetars and Fast Radio Bursts</b>	Dr Samuel Lander UEA
Friday May 8 <sup>th</sup>	<b>Apollo</b>	Jerry Workman G&L School Hammersmith