



Breckland Astronomical Society

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

EXTRA TERRESTRIAL

Newsletter March 2026



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 March 2026

After a deluge of wet weather in winter, let's hope our patience for seeing the sky is rewarded this spring. On those rainy nights, we are always working in small ways on improving the observatory e.g. we shall be making sure the telescope drive belts are replaced. Our open evenings have been really popular, so much so, we ideally would like more volunteers and more space, but we do have an exceptionally good team at the moment. The building contains many telescopes, most of perfectly good optical quality, however they are not just pick up and play items. If anyone is interesting in trying one out, or you know of anyone, we may be able to advise on how to use it on a Tuesday night.

Last March we heard of a potential Earth Impactor Asteroid, however this has now become a 4% chance of impacting the Moon. The larger asteroid Apophis is due for a very close pass at the end of the decade. In other recent sky news, we have seen some Auroral activity, especially the really strong one only the very Eastern Norfolk folk got to see Jan 10. The magnetic disturbance was very high, 1300nT! Both good displays occurred in evenings but the cloud had set in just before that and remained ever since.

I'm heartened to hear Thorington Street in Suffolk is now an International Dark Sky Community, well done. We certainly need protection and enforcement against this scourge of misaligned and misplaced, overbright lights from industry and individuals alike, may this status help in that regard.

We are all really pleased to see a real increase in subscriptions and I think a lot of that is due to Keith Fowler's efforts as membership secretary and treasurer. The website has also been improved and tweaked and Andrew Luck has purchased an SSL certificate, so now we can have <https://> at the start. This is the default security for webpages and so all links should work now. There are many resources now on the website, including all recent newsletters from 2020, all info, maps, light pollution, images, and history of construction. The xmas meal was popular last year as was the 2024 barbeque/ perseids/ aurora evening, so we are rerunning those activities this year. Sadly we don't have time to make a teddy bear.

Regarding the photo competition, we are looking at picking 12 images from varied contributors for a 2027 calendar. I understand 2026 has been a wet start, so let's hope for some aesthetically inspiring marvels, if sent to us via the facebook page, we will assume they are available for us to judge and we will let you know if we are interested but they can be sent via email also.

Mick Ladner is busy with an amazing volunteering project at the moment so we are again looking for someone who is email proficient that knows us and can coordinate visits from local groups (often of youngsters) to the observatory. He is still a very active astronomer and member, just doesn't quite have time.

Just a reminder that this society is a UK Charity run entirely by volunteers, as it always has been and we should keep it that way. We will gladly reimburse expenses and fees if discussed. BAS finds funding from membership fees, legacies, events/sales, gift aid claims and interest. Therefore we appreciate all contributions, especially time contributions and all that has been given so far.

And many members may not realise the small amount of regular jobs that go in to keeping things running and organised. As Chairman I would not like anyone to think they have been pressured into volunteering (despite feeling the pressure sometimes myself on top of life, which is always busy). This way hopefully people feel individually responsible for their creativity and contribution to astronomical education. That giving of your time can be of real benefit to some people, me being one of the beneficiaries when I joined in 2007.

As such, **anyone with a modicum of enthusiasm for astronomy who wants to hang around with us on Open Evenings** (which are very popular these days) **would be extremely valuable!**

A word about our new membership management system from our membership secretary and treasurer:

“Earlier this year, BAS made the leap into the modern world and moved to a membership system called MemberMojo, retiring our previous combination of spreadsheets and multiple paper forms per member.

The new system makes life easier for everyone. It gently reminds members when renewals are due and lets you update your own details whenever needed. We know that telling BAS you’ve moved house is rarely top of anyone’s to-do list, but keeping details up to date really helps us with things like Gift Aid.

Existing members can now renew online in advance, which should mean less queuing and more chatting at the first meeting of the year.

For new members, we used to offer half-price membership from July onwards, as this only covered half a year, and in practice we often waved people through in the last couple of months anyway. To keep things simple, new memberships are now a rolling 12 months. In other words, you get a full year from the day you join - join on 21 June, renew on 20 June the following year.

Although you can pay online using PayPal or a debit or credit card, all the familiar methods are still available. If you prefer bank transfer, cash, cheque, a SumUp link, or the SumUp card reader, just select that option when renewing. Even if you’re paying by bank transfer, simply check your details, choose Bank Transfer, and you’re all set.”

Keith ‘Keip’ Fowler

The Solar System

The full moon on March 3 is called the Worm moon, and on April 1 is actually called the Pink moon, and no I’m not kidding.

The Lunar ‘X’ should start appearing throughout the evening of March 25 when the phase is 49%. (Calculations thanks to Mary McIntyre). The Next Clair-Obscur effect occurs two days later on the 27th during the daytime (moon rise in the NE) when the ‘Eyes of Clavius’ appear on the dark crater floor as the sun starts to rise there on the lunar surface, catching the craterlet tops.

On March 29 Regulus appears suddenly from the bright (NE) limb of the moon at 20:21. Check out this prediction from your location as times may vary a little, using convenient software e.g. Stellarium.

For those interested in dark skies for observing faint objects until midnight, the moonless seasons start on March 8 and again on April 6.

April 19 – An 8% crescent is just above the Pleiades in the twilight. If you are especially lucky you may catch the 3% crescent on the 18th.

April 23 the moon is North of Jupiter.

April 24 daytime the Lunar X appears at noon, followed by a face in the shadows of crater Albategnius appearing near sunset.

Mercury is not visible during this period for the UK.

Venus emerges from evening twilight throughout the period. On 7th and 8th March Venus is about a degree from Saturn, although this will be very low and hard to see. On 23rd April Venus is south of the Pleiades and Uranus is 40 arcmin to its South.

Mars is not visible until perhaps June in the dawn sky.

Jupiter is high still and visible throughout March and April but it does get lower in the West and recedes so viewing conditions deteriorate slightly. Times below in GMT shifting to BST.

Mar 1 Ganymede goes into shadow 19:55 reemerging at 23:12 while Io transits from 21:37 and its shadow follows it 22:40 along with the Great Red Spot coming into view (Sunday eve)

Mar 5 Europa transits from 23:21

Mar 7 Europa emerges from shadow 22:27 (note these occur East of the disc of Jupiter)

Mar 8 Ganymede emerges from Jupiter 22:31. Io transits from 23:28 with GRS visible.

Mar 9 Io disappears behind Jupiter 20:45 with GRS visible.

Mar 10 Io transits 17:56 (day) – 20:12, shadow follows from 19:05 – 21:12.

Mar 14 Europa disappears behind Jupiter 19:46 GRS visible. Reemerges from shadow 01:04.

Mar 15 Ganymede disappears behind Jupiter 22:55.

Mar 16 (from dusk) Europa shadow transit until 20:01. Io disappears behind Jupiter 22:35.

Mar 17 Io and Callisto SIMULTANEOUSLY start transit 19:48. Io shadow starts 21:00 also.

Mar 18 Io reemerges from shadow 20:33. GRS turning into view from 22:00.

Mar 19 (from dusk) Ganymede shadow transit until 21:13

Mar 21 Europa disappears behind Jupiter 22:19

Mar 23 Europa leaves transit 20:14. Shadow transit 19:46 – 22:36

Mar 24 Io transits from 21:40-23:54, shadow from 22:53

Mar 25 Io disappears behind Jupiter dusk 18:58. Io reemerges from shadow 22:29.

Mar 26 Ganymede transit dusk-20:09 shadow from 21:58. Io shadow transit dusk -19:35.

Mar 30 Europa transit 21:02-23:44 shadow from 23:31.

Mar 31 (Apr 1) Io transit from 00:35

(planet size now shrinks to 38" cf 46" at opp)

Apr 1 Io disappears behind Jupiter 21:51
 Apr 2 Io in transit dusk-21:17 shadow 20:18-22:31. Ganymede transit 21:55-01:05
 Apr 3 (4th Callisto shadow transit 02:16- low altitude)
 Apr 6 Europa transit 23:36-02:20 shadow 02:07-
 Apr 8 Europa reemerges from shadow 23:16. Io disappears behind Jupiter 23:45.
 Apr 9 Io transit 20:58-23:12 shadow 22:15-00:26.
 Apr 10 Io reemerges from shadow 21:47
 Apr 11 Callisto disappears 21:17 reappears from dark side 01:21 (12th)
 Apr 15 Europa disappears 20:26 (dusk)
 Apr 16 Io transit 22:55-01:10 shadow from 00:10 (17th)
 Apr 17 Io reemerges from shadow 23:42
 Apr 20 Callisto shadow transit from dusk 20:19-00:29. Ganymede reappears 23:04.
 Apr 22 Europa disappears 23:07
 Apr 23 (24th) Io transit from 00:55 (10 degree altitude)
 Apr 24 Europa transit ends 20:56 (dust) shadow from 20:34-23:20
 Apr 25 dusk Io in transit ends 21:37 shadow transit starts 20:35-22:47
 Apr 26 daylight Io reemerges from shadow 20:05 30" east of disk near Amalthea elong 21:26
 Apr 27 Ganymede disappears 23:50
 Apr 28 Callisto reappears dusk from 20:07-20:18 dark side of Jupiter, high altitude.

A fifth moon, Amalthea, discovered visually by telescope by E E Barnard in 1892, is the 5th largest moon (Jupiter V) has an almost exactly synchronous orbital period with Earth's rotation period. Therefore it appears in nearly the same spot night after night. Fortunately it is at western elongation 21:47 March 1st slowly reaching 00:55 on April 1st. Its magnitude 14.3 is very faint compared to the -2.0 of Jupiter thus it needs careful techniques to image with good clean optics and high focal length.

Easier to image is Himalia (Jupiter VI) is a 90 mile diameter moon of 15.0 magnitude and about a degree from Jupiter. It appears as a faint star in large telescopes if you know exactly where to look. It has a long orbital period. The other outer moons e.g. Elara, etc are quite a lot fainter, but can be photographed, appearing as streaks during long intervals. Stacking on the stars make the moons difficult to pick out from the noise. Advanced stacking involves knowing the motion of Jupiter against the stars and required sophisticated programs.

Saturn

Very low in the sky in early March it approaches Venus on the 7th and 8th March, but is much, much fainter.

Uranus – is visible near the Pleiades

Meteors

Lyrids meteors April

Comets

Comet C/2024 E1 Wierzchos rises in Eridanus and Taurus during March and is visible low in the evening sky, fading from its good magnitude it achieved when it was visible in the southern hemisphere. As it rises, it fades quickly but still becomes easier to find for a while, approaching Aldebaran for a few days around the 3rd of April.

Interstellar comet 3I/ATLAS has faded very much as it is now very distant, 4AU so not a good target. Late February estimates put it as 15.8 magnitude.

29P/Schwassmann-Wachmann has outburst again in early February, it may still be showing some enhanced brightness. This comet is basically out at Jupiter (6 AU) in a low ellipticity orbit, making it unusually visible so far out, yet it is quite unstable. It usually hovers about magnitude 16 but may often reach at least 12 for a while. It is on the border between Leo and Sextans not moving much against the stars. Opposition is on 11 March. <https://skyandtelescope.org/astronomy-news/ice-volcano-eruption-makes-comet-29p-schwassmann-wachmann-shine/>

24P/Schaumasse is fading and receding and back in Virgo, on a retrograde loop, it stays fairly close to us within 1 AU until May.

If you follow comets, perhaps by looking at heavens-above.com you may have heard of C/2026 A1 MAPS, this is set to come close to the sun and reach an incredible brightness. I would not get my hopes up of seeing this in anything other than solar coronagraph images. It gets so close as to possibly break up and it isn't all that bright when not near the sun. We have seen many of these before, such as a SOHO comet a decade ago, and comets are very unpredictable. This one isn't visible from the UK in any case either side of perihelion.

210P/Christensen is fading after perihelion and will be very dim but is located in Libra/ Serpens so visible in the midnight - morning sky in March especially. You never know how visible this Jupiter family 5.7 year orbit comet will be.

Check out <https://heavens-above.com/Comets.aspx> plus you can link to asteroids from there.

Asteroids

1 Ceres has faded and will disappear into the twilight of evening.

7 Iris is fairly bright 9.5 magnitude and to be found in Sextans.

10 Hygeia is in Taurus at the top of Orion's arm – an interesting asteroid to look up. It should be around 12th magnitude.

11 Parthenope is approaching its best in Leo – 10th magnitude.

15 Eunomia is at its best in Corvus 10th magnitude.

20 Massalia can be found in Virgo, 9th magnitude.

44 Nysa is in Gemini/Cancer at 10.5 magnitude. It is a rare class E type, the biggest of its type.

80 year Nova star T CrB is still low but it starts appearing in the North East at 1am in January, and 11pm at the end of February. When is it going to erupt?

Deep Sky

From Keith's talk last December here are some nice examples of Planetary Nebula to observe – edited for this season

The dumbbell nebula M27 is lovely and bright and large – Vulpecula summer-autumn but can be found in the morning sky in spring.

The cats eye NGC 6543 with its twisting braids is visible most of the year

The fetus nebula NGC 7008 in Cygnus (summer autumn and winter) mornings in spring.

The blinking nebula NGC 6826 in Cygnus (summer autumn and winter) - In a 6" scope it appears and goes away when looking at it.

Ghost of Jupiter 3242 Hydra (spring)

Eskimo Gemini NGC 2392 (winter)

And of course the Ring Nebula M57 in Lyra. It's apparently a barrel looked at from one end

The Owl Nebula M97 in the Plough ideal in spring.

The Little Dumbbell M76 getting a bit low in the NW but circumpolar

There's a lot of debate how far away many of these are.

For a tip - Use a Lumicon Ultra High Contrast Filter -It only lets through Oxygen three and Hydrogen beta. They can be flipped in front of the eyepiece but should be screwed in the bottom.

The real challenges to see are the Abell Planetary catalogue. Extremely old and faint ones picked up on sky survey plates. There is a tome compiled by Owen Brazell at the observatory about how to find these in big telescopes and charts etc.

In terms of galaxies, we have the Virgo and Coma cluster, but across the other side of the sky there is IC 342 hiding in North Camelopardalis, at 8th magnitude. It is 22 arc min and face on but hiding behind galactic dust so it has a very low surface brightness. It should be visible in binoculars but needs a dark sky. Somewhat nearby is M101, a similar appearing galaxy in Ursa Major.

While in Camelopardalis, a beautiful wide field is Kemble's Cascade in the mid-south of the constellation still nicely visible above the North horizon in binoculars on a dark night.

Multiple Star of the month

38 Lyncis – just above the faint stars of Cancer the crab are two more stars at the bottom of the Lynx – the top of the two is a nice tight double showing two stars 2.6 arc sec apart. The main component is 3.9 mag with the companion 6.1 that has been described as blue-white or even lilac.

The period of orbit is 429 years. The faint component is also a binary 0.06-0.3 arc seconds apart. Another faint companion 100" away has the same proper motion so is probably associated. The A star is A3 type 8900K 3 solar radii 2 solar mass, 30 solar luminosities. The B star is A4 so the colours should look indistinguishable, if they don't it's a trick of the eye! It consists of two 1.3 and 0.9 solar mass stars orbiting in a 2 year period. The E star (apologies C and D are not associated) is 15th magnitude and a red dwarf – 0.31 solar mass 3800K M2 type.

Mira stars (variables)

Try to catch Mira – omicron Ceti in the western twilight it should be just at or past its maximum. A whole 9 magnitudes brighter than at its faintest.

Submissions of magnitude estimates to aavso.org or britastro.org are always welcome.

Check out our webpage at <https://www.brecklandastro.org.uk/>

Talks

Dr Simon Bennett FRAS – Owner and Director of The Widescreen Centre astronomy equipment sales.

The talk was cancelled due to illness reported on the day. Simon is happy to come back in April.

Mary McIntyre FRAS

Attendance 31

Also we had two open evenings that were very popular Dec and Jan 100 and 80 people respectively but they were both cold and cloudy the latter featured a rain shower. But all enjoyed the nights and we had some extremely kind reviews. Thanks Jean we hope to see you more. We also have a nice new "Open" sign that is a dim red colour – ideal! The picture wall needed an update so is looking a bit bare at the moment. We tried to do the astro-themed chocolates for kids but got too busy!... Sorry we will try next time.

In place of the talk we hosted a much-needed Telescope Workshop during the February half term, a response to a noticed need. I think we gave some useful advice and it certainly proved that having a practical session really was necessary. It was very cold (-1C) and patchy alto cloud throughout. We had some bonus observing as people wanted to get out of the cold into the dome. It was nicely staffed with volunteers but more are always needed, as it was quite popular (30-40?).

COMING UP – Jan and Feb talks

Dr Simon Bennett FRAS of the Widescreen Centre is demoing the most convenient and inexpensive new telescopes that are currently becoming very popular as you can get images from the comfort of your home. See these (probably at January sale prices) and you may get info on new lines ahead of others at Simon Bennett's talk on Friday January 9th.

Mary Macintyre FRAS

After getting quite enraptured by the tale, I forgot to take good notes. Needless to say it was a hilarious comedic intro on women's oppression and the Ancient Greeks wandering womb hypothesis! She is a very captivating speaker. For example:

“Boys book of space”, “Space pyjamas for boys” (despite my own daughter liking space ones)

1800s: women had to rely on males around to get their education. Cambridge Uni didn't allow women to take degrees until 1948. Several colleges at Oxford didn't until 1979! And that was after the sex discrimination act.

Late 1800s: Harvard computers no physical work allowed. Only typist etc "Docile mind" and then they were not expected to work at night.

The men took credit for their discoveries.

In 1977 there was an unconscious bias of 4:1 men to women. This disappeared when sex blinding started. This also happened with Hubble telescope scheduled jobs.

We mention Caroline (Lucretia) Herschel but... she was not the first to discover a comet nor be paid for astro work!

The first known was En'hedu'anna, an ancient Sumerian chief astronomer 2300BC she was also a priestess. And Babylonians did clay tablets.

Aglaonice of Thessaly 100-300 BC Predicted eclipses. She was accused of witchcraft. But set up a school. Astronomical events then filled people with awe, fear and dread.

Hypatia of Alexandria 350-70 AD - 415 AD

Fictional drawings of her. She was hunted by angry Christians who murdered her with oyster shells. She wasn't killed for her science Vs religion views she was caught up in politics .. The legend of St Catherina is based on her. Two lunar craters. Martyrs crater smaller.

Middle ages was a dark time for science. There were omens in everything. The burning of Alexandria library occurred and there were accusations of heresy for discoveries.

Since then we are still recovering from this.

Sadly, now NASA have been taken over by the current US administration and deleted mentions of women's contributions to astro. Right NOW! What is going on there?

In Euclid's "Elements" a lady taught science – the Greeks had pretty good equality.

Jumping forward in time, Hildegard von Bingen was one who was admired by Mary M.

She was a Benedictine Abbess, a writer, composer, and theologian who had visions. Medieval art portrayed her with what Mary described as Zoidberg (from Futurama!) on her face – this was a representation of her “visions” – as found in a Kraft beer subscription magazine article from a monastery that grew hops and made beer. She had severe migraines. Auras were her visions

perhaps. But what a polymath! Look up her music too! Choral. She has a crater named for her on the lunar far side in a weird triangular shape.

Fátima of Madrid only mentioned in 1924, from C10-C11 Andalusia. She used astrolabes and wrote a book on it.

The renaissance gave a shift in culture.

All heard of Tycho Brahe? What about Sophia Brahe? Lived 1556-1643 so a much younger sister to Tycho. She worked with him in the Observatory. He built sky precision measurement instruments. They did astronomy despite their parents general objections. They both watched SN1592 unfold in Cassiopeia. Planet movement was a new science and she helped greatly, but she rarely got credited. Her husband and the marriage totally stopped her working, but he died young and so she gladly went back to working on astronomy!

Polish astronomer Maria Cunitz 1607-1664. She was judged for not doing her housework.

Elisabetha Koopman Hevelius she approached Johannes Hevelius a brewer. She would knock on his door as a girl and ask to study with him. he finally said yes when she was 15. She was besotted by the full moon and married him at age 16. After he died she pulled papers together and got them published.

Maria Margaretha Winckelmann Kirch 1670-1720 met the Brian Cox of the day Gottfried Kirch who she got married to. And became his assistant. She couldn't log a comet had to put it in as his name. Prussian Academy refused her work there after he died. They wouldn't hear of it. They feared it would set a bad example.

Maria Eimmart had artistic flair (as Mary!!). She did blue board etchings Saturn and comets and moon etc. parselene optics etc! You can see how Mary got inspired! They are beautiful!

(Q at end What do you use? For Deep Sky Sketches)

Laura Maria Caterina Bassi Veratti 1711-78 got a doctorate in sci from U of Bologna. Became first salaried female lecturer. 1776 chair of experimental physics.

Wang Zhenyi 1768-1797. Models of lunar eclipses. Author. Outreach. Had a grandad with a library. 1994 crater on Venus. They named them all after women!!! You can't see them.

CAROLINE HERSCHEL (Mary's favourite!)

Living 1750-1848 she was the youngest female daughter, but caught typhus at age 10 and lost sight in one eye and had stunted growth, she was just 4 ft 3 in height and a survivor.

Her dad and William took her out at night to see the stars and a solar eclipse. Her mum disapproved. She redacted her memoirs to be good about her family but Her mum whipped her and didn't feed her well. There were some terrible stories of her upbringing. Alexander Herschel was also in Bath and invited her over from Hanover to be a musician with him. They were short of money. She couldn't speak English well. She taught herself music and became successful but was also a servant. She ended up becoming an astronomer. She planned her observations and also

fed her brother William as priority. She helped make and polish mirrors and swapped them out. She got a salary thanks to the King of Denmark. Discovered lots. And finally in her lifetime got recognised. She kept the most beautiful notes.

Subscribers can access a link to watch the video of Mary's talk, which was via Zoom. The connection failed for a while near the end but we regained it and asked some questions. Mary was extremely helpful with all elements of the talk delivery and recording. Many thanks. There was a lot of call to get her back, so she suggested October. See you again in autumn!

Coming up

Dr Sam Lander UEA is talking about Fast Radio Bursts and Magnetars, as he is an associate professor of magnetar modelling.

BBQ and Perseids are back this year August 9th Sunday.

Always remember we are pleased to help anyone out who is struggling with a scope or not using it. Look for advice here in this newsletter – please recommend it to folk (many thanks to Chris for his useful / technical articles) or contact one of us chairman@ or treasurer@brecklandastro.org.uk

Past newsletters since 2020 are on the webpage. Currently visitors@brecklandastro.org.uk isn't being monitored, so try one of the other email addresses while we find new helpers. Clear Skies! Feedback is really welcomed as we want to know what you want to know!

Dan Self

John's News Notes

On Wednesday 11 Feb Space X sent 24 more Starlink satellites into Low Earth Orbit. Approximately one or two of these burn up in Earth's atmosphere daily. The rate of burn ups has decreased somewhat after an initial heavy deorbiting period late 2024. As well as implications for orbit the use of these satellites has implications for pollution of the upper atmosphere.

On Jan 31 we heard Elon Musk had applied to the FCC Space Bureau (a US based regulator) to launch 1 million satellites into orbit including planning Orbital Data Centers in high orbits, proposed as a greener solution to computing power by avoiding cooling costs. Musk denies creating congestion in space citing the argument that space is so vast as to be beyond comprehension. Currently nearly 10,000 are in the Starlink network.

Europe's New Rocket Ariane 6 launches 32 satellites in space for Amazon.

In February (so this should have already happened) Space X hopes to launch its Crew 12 on Dragon/Falcon 9 rocket.

Space Launch System Artemis 2 is now geared up for a launch in early March the launch date is provisionally set for the 6th. NASA has pushed back the launch of Artemis 2 to March because of fuel leaks.

A Boeing CST 100 Starliner Spacecraft is going to the I.S.S.

A Vulcan Centaur Rocket will launch its second demonstration flight for its Dream Chaser Spacecraft.

The Voyager 1 probe crossed into Interstellar Space in August 2012. It was launched in September 1977. When it was at Saturn it discovered 5 new moons and a new ring - the G ring.

John Copsey

Detection & Analysis of Meteors by RADAR

(Using the GRAVES space surveillance transmitter)

History

Traditionally meteors have been studied optically, initially by counting the number of visible trails per minute or hour and logging the intensity and direction from which they seem to arrive. Latterly, sensitive film was able to be used with all sky camera lenses to collect data for subsequent analysis. In recent years sensitive video cameras have been brought to bear to record and store meteor trail images.

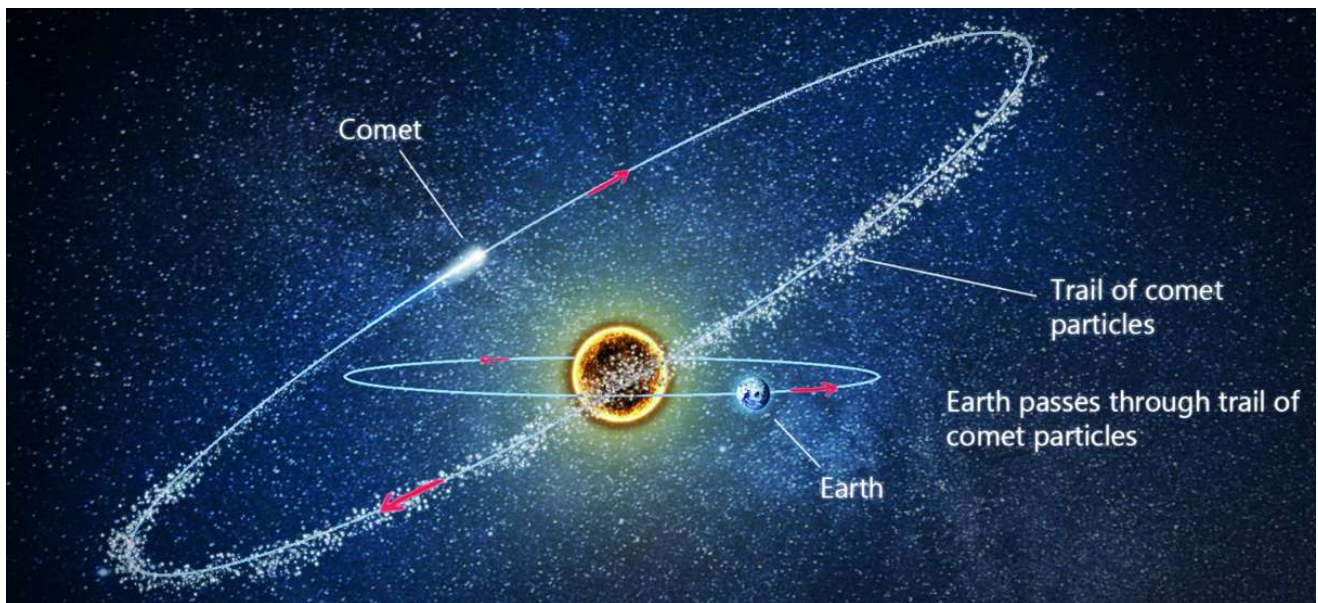
During World War 2 and the development of RADAR, it was noticed that meteors could generate 'false echoes' and subsequent adaptation of war surplus equipment led to considerable work on the detection and analysis of meteors. The RADAR detection of the ionised trails left by meteors is relatively straight forward and a great deal of information can be deduced from the details of the return signal. The analysis of the sometimes complex returns is quite challenging and much effort has been devoted to determining the statistics of meteor numbers, mass, trajectories and the manner in which ionisation trails develop, break up and decay.

How Amateurs can set up a Meteor Radar

Some experienced radio amateurs are capable of building a complete RADAR system with both transmitter and receiver. Fortunately for most people it is not necessary to own and use a high power transmitter with all the issues that this involves. The existence of high power broadcast transmitters in various countries means that there is no lack of signals reaching the ionosphere and capable of interacting with meteor trails. Many amateurs made use of old VHF analogue TV transmitters, With the advent of specialist very high power continuous wave (CW) transmitters in several countries, it is now possible to use these as the basis of a Meteor Radar system.

Detection of Meteors by RADAR

Showers and sporadic meteors rain down into the Earth's atmosphere at all times in a sporadic variable manner. Thus they are termed the 'sporadic meteor background' and visible trails can occasionally be observed in any given hour. At certain times of the year however, the Earth moves on its orbit into a concentration of meteoroids that may be associated with particular comets or asteroids. At these times the rate of meteor impacts on the upper atmosphere increase considerably – to a few hundreds per hour – and these are termed meteor 'showers'. The meteors appear to come from a single region of the sky called a 'radiant' and the shower usually takes the name of the constellation in which the radiant is to be found.



The main meteor showers are listed below and show : Shower Name/Date of Maximum Normal Limits/ Rate per Hour

Quadrantids; Jan 3-4 Jan 1-6; 60; Blue meteors with fine trains

Lyrids; April 22 April 16-25; 20; Bright fast meteors, some with trains. Associated with Comet Thatcher

Eta Aquarids; May 5 Apr 24-May 20; 35; Low in sky. Associated with Comet 1P/Halley

Capricornids; July 8-26 July- August; 10; Bright meteors

Alpha Capricornids; Aug 2 July 15- Aug 25; 5; Yellow slow fireballs

Perseids; Aug 12-13 July 23- Aug 20; 75

Orionids; Oct 22 Oct 16-27; 25; Associated with Comet 1P/Halley

Taurids; Nov 4 Oct 20- Nov 30; 10; Very slow meteors

Leonids; Nov 17-18 Nov 15-20; Variable (30-300); Fast bright meteors with fine trains. Associated with Comet Tempel Tuttle

Geminids; Dec 14 Dec 7-16; 75; Plenty of bright meteors, few trains

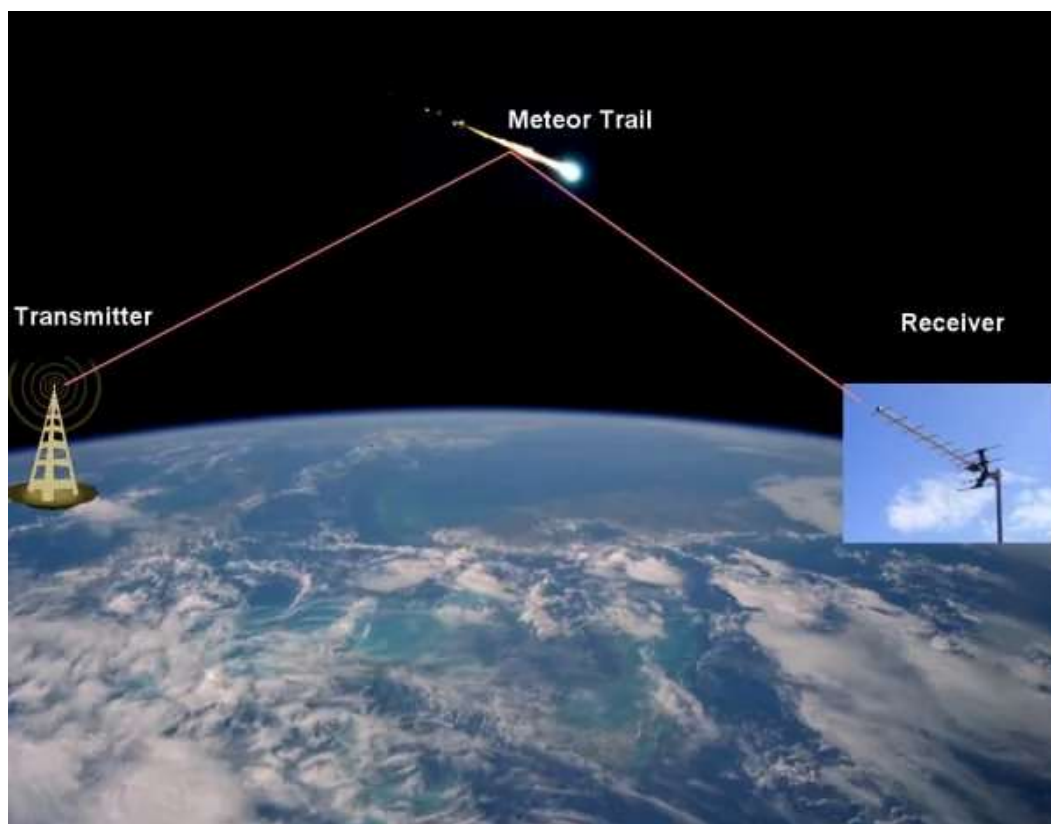
Meteor trails are formed when tiny particles, maybe the size of a grain of sand or smaller, impact the Earth's upper atmosphere at a height of around 90km and generate a strong shock wave in the air. There is a huge temperature differential generated across the shock boundary and the radiant heat vaporizes the surface of the particle. This causes the ablation of the particle and ionisation of the atoms of the material, producing radiation across a broad optical spectrum.

The vaporised material and ionised air play a large part in reflecting electromagnetic waves at radio frequencies – thus enabling their detection by VHF radar. The larger the meteoroid, the longer and brighter is the meteor trail, with some very large particles producing intense trails called ‘fireball events’

Radar Basics

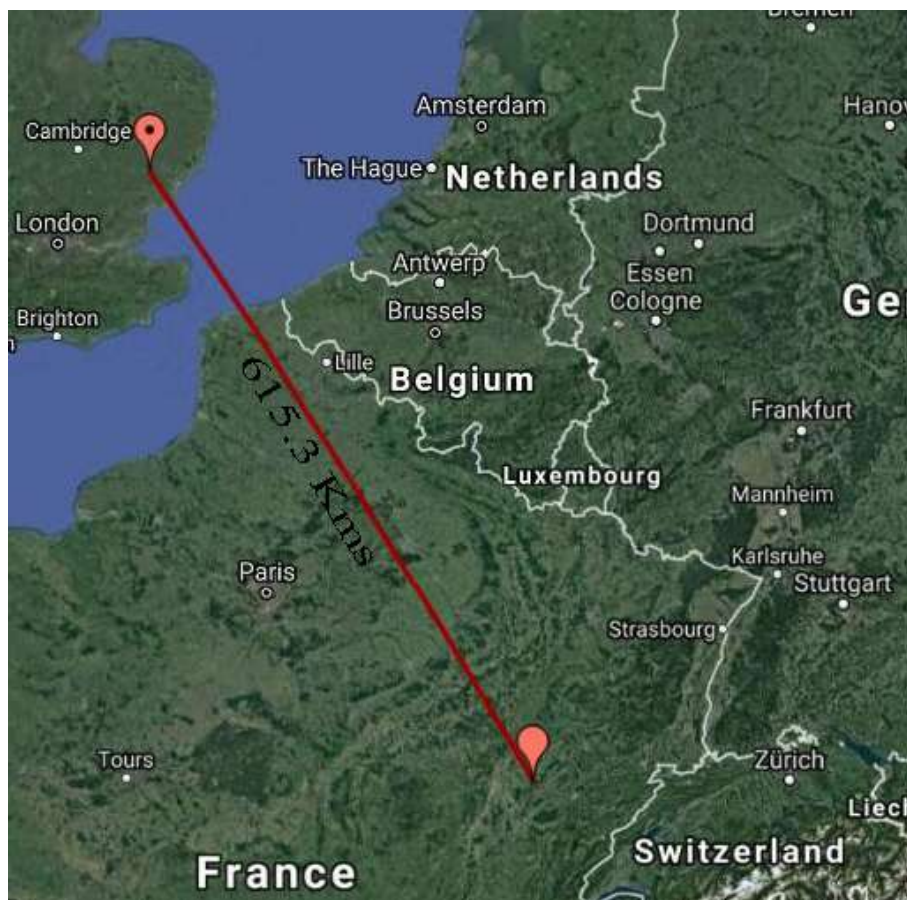
Early Radar was based on the transmission of short radio pulses from a directional antenna toward a target. The radiation was scattered by the metallic target and some of the energy returned to a receiver tuned to the frequency of the transmitter. Often the transmitter and receiver were co located. The pulses had to be short enough to give a clear sharp echo and the time between pulses had to be long enough for the ‘round trip’ to and from the target to finish before the next pulse was sent out.

With forward scan radar the transmitter is not at the same location as the receiver. This can give advantages and disadvantages; the greatest advantage is that it can use any commercial or military transmitter without the expense and legislative complications. The only disadvantage is that because there is no synchronisation with the transmitted pulse direct ranging is not possible. Another advantage if the transmitter and receiver are separated by a long distance is that normal air traffic is not detected.



Detection of Meteors by RADAR

Graves Radar: This is operated on behalf of the French Air Force to detect spacecraft and space debris as it crosses the French airspace over the Mediterranean. The radar is located near Dijon in central France. The transmitter is located some 800km from the author's amateur receiving station that was used to produce data shown later in this article. There are four phased array antennas that direct their beams upward.

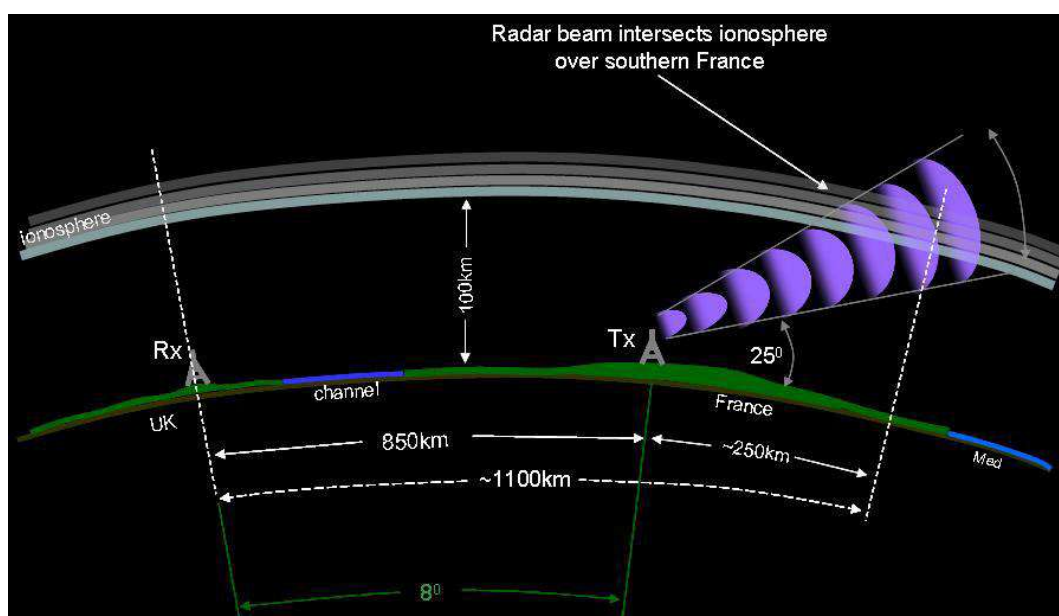


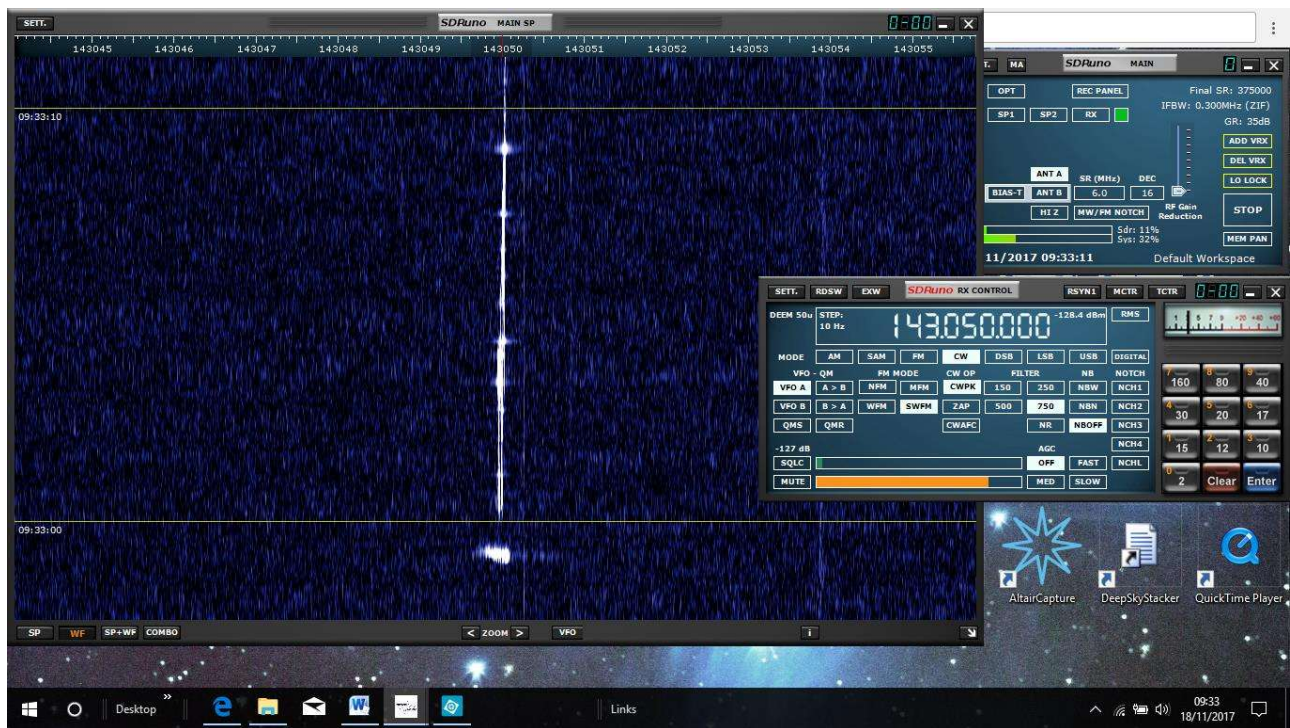
Receiving System: The receiving system consists of a simple antenna and a communications receiver capable of receiving 143.050MHz with a single side band (SSB) demodulator. The simple antenna shown is a 3 element Yagi.



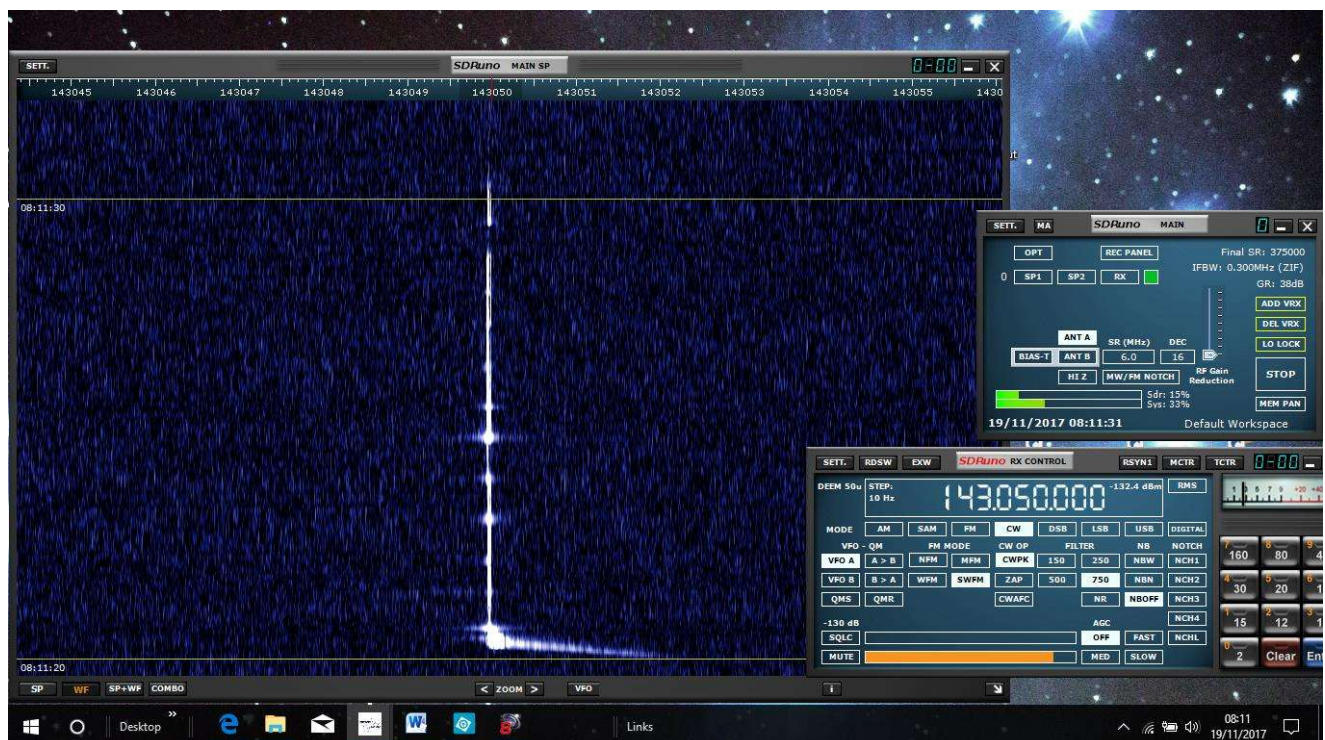
A YAESU FRG8800 Receiver is used. The SSB detector is required in order to generate an audio signal with a frequency related to the Doppler shift of the radar return. This audio signal can then be analysed in a spectrum analyser to reveal the many frequency and time forms of the meteor trail signal. Originally an ESU has proven to be more suitable. The receiver audio output is fed into a Behringer UMC204HD analogue to digital converter. This is used to give more control over the audio signal.

The most convenient spectrum analyser to perform this task is based on Fast Fourier Transform (FFT) software - of which there are a number of examples freely available from the internet. An example of the output from the Spectrum Lab software 3 is shown.



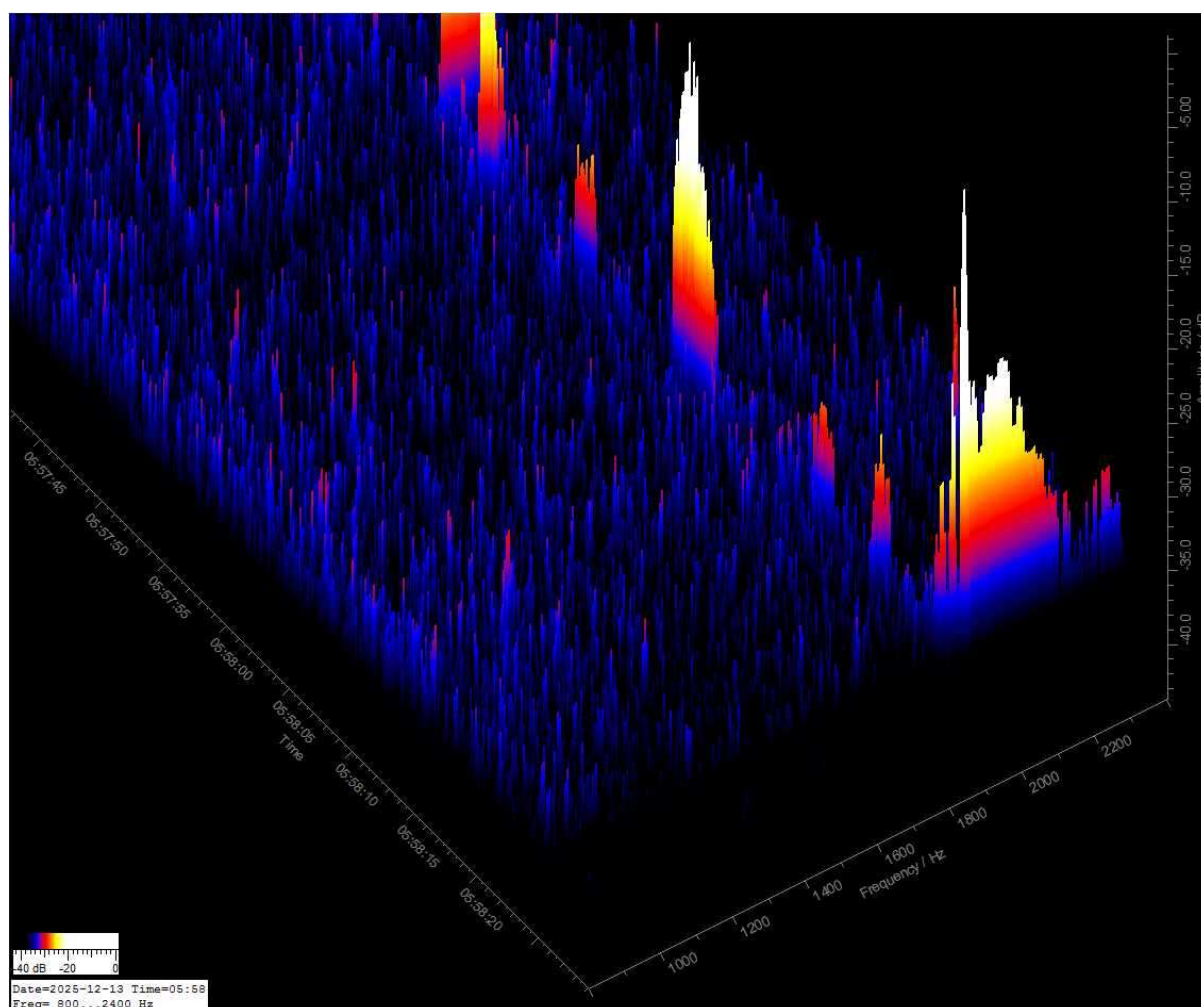


In this plot frequency equates to line of sight velocity of the meteor and is shown in the waterfall plot. The vertical axis is time, with the markers at 10 second intervals. The horizontal axis is the frequency this can be used to show doppler shift and therefore speed changes as the meteor slows down



At the lower part of the above image is a large doppler shift shown as a meteor slows down and then ionises the trail with several subsequent bursts. (The waterfall display is going from top to bottom).

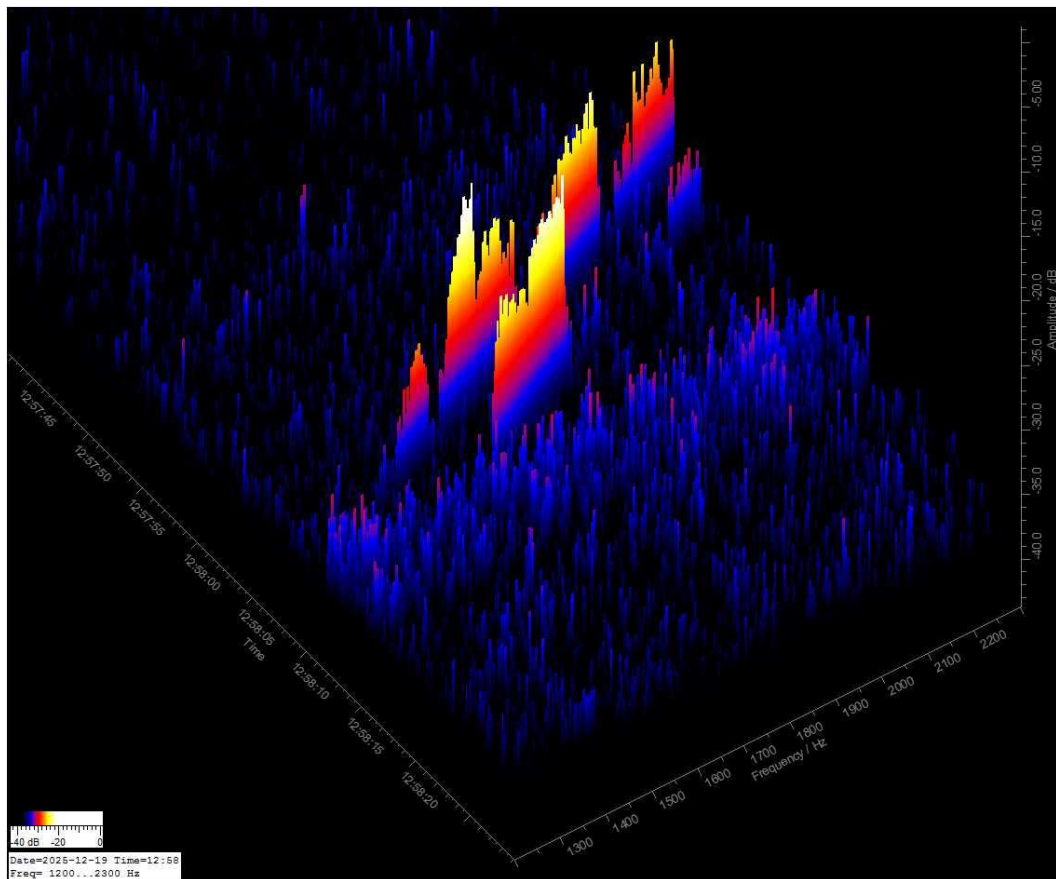
These are 2D displays and the intensity is only shown by the apparent brightness. To show this better and quantify the intensity a 3D display is used.



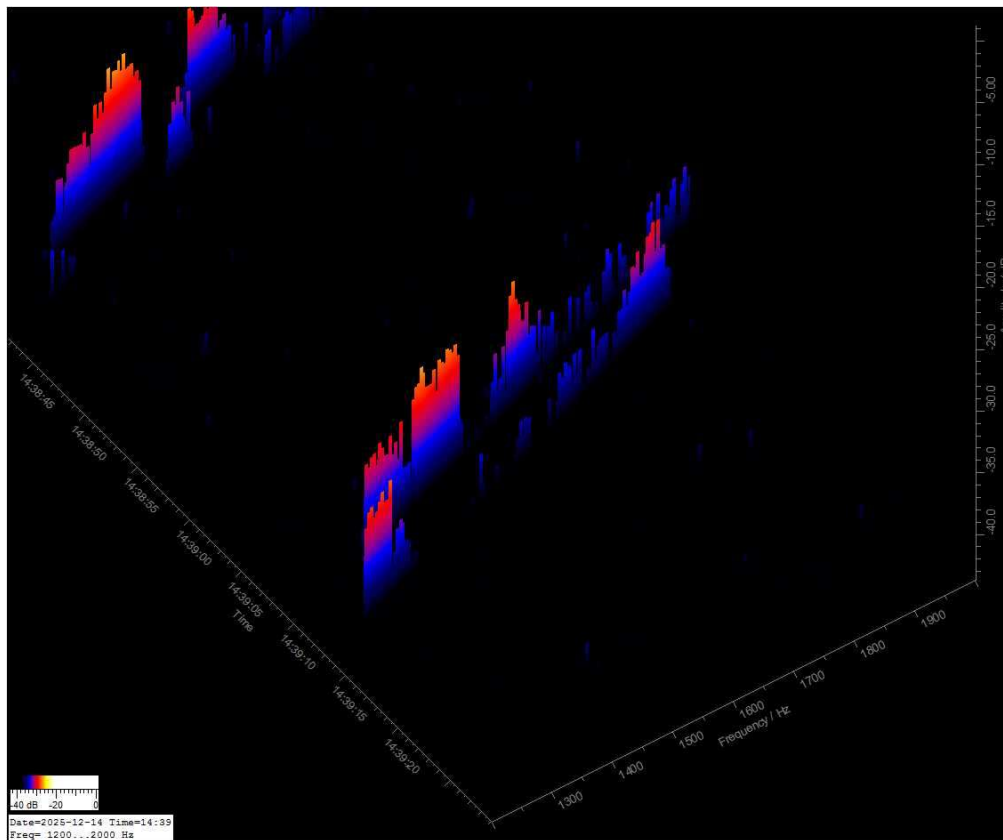
This shows much clearer the peak of the meteor echo as well as any doppler shift as shown in the right-hand echo above. There are also other echoes from meteors without doppler shift. The programme used to obtain the above display is Spectrum Lab. This is a free programme and very versatile in its use.

Counting Meteors

To get usable data it is necessary to count the meteors (usually per hour but for some short showers a shorter time frame is used). There are several programmes that have been developed that appear to allow this counting to be completed automatically, but personally I have found that they are not very accurate due to the method of their counting. They basically look for a peak in the signal and assume that is a meteor strike. Unfortunately there are several other sources that can cause a peak in the signal. The most common is StarLink satellites. Due to travelling at a constant speed they show a distinctive pattern and constantly changing doppler shift. The image below shows the typical pattern given by 2 StarLink Satellites crossing the detection area.

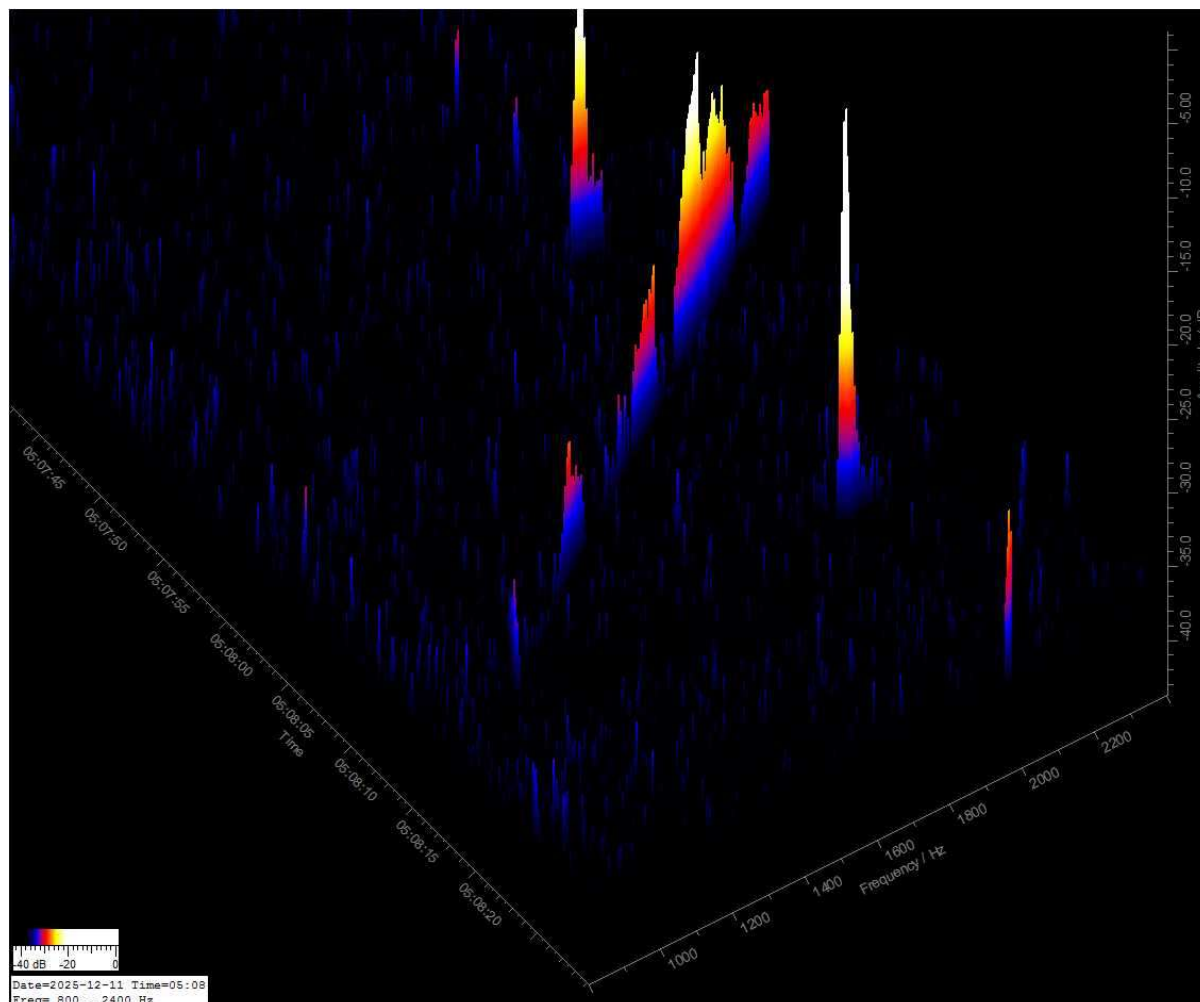


Sometimes the traces are less intense maybe as the StarLink satellites get into a higher orbit.



This makes counting difficult as on the frequency there is still a peak in the intensity. The International Space Station is also detected as are some other higher orbit satellites. These also show a constant change in doppler shift although this appears at a different angle due to the different orbital speeds.

The problem comes when you have a StarLink satellite pass with an actual meteor track.



In the above example one echo is obviously a StarLink Satellite. The 2 echoes either side of it are Meteor detections which leaves the left hand one; the question is Satellite or StarLink? I would put it as a Satellite due to the diagonal trace behind it. Actually, it became clearer on the next screen dump as there was a clearer trail on the other side. Most counting software would see this as 4 meteors.

There are other false echoes such as the top 2 in the above screen shot which are possibly caused by ducting of the VHF signal. These are usually relatively easy to spot as they are evenly spaced due to the transmitter swop sequency.

Therefore, I have found manual counting is the best method. This is not without its problems as there is a screen dump every 30 seconds. That means that there are 2880 screens to check per day. Most meteor showers are over several days so the workload can be quite daunting. I have also started tracking on the U.K. Meteor Beacon; this doubles the count and brings in additional

challenges. With GRAVES, aircraft are not a problem as over the detection area they are too low to be above the horizon of my receiver. With the UK meteor beacon this is not the case, so additional false echoes occur. Also, I have not acquired the same level of experience of interpreting the screen shots. I estimate that in the years that I have been using GRAVES I have searched through over 800,000 screenshots.

Chris Bailey

A visual ramble from Virgo to Leo

This is the article I briefly noted in the last newsletter with some simulated visuals and the processed pictures from the session. It was the night of December 26-27th 2025, another very clear night at the Observatory. After an imaging session I saw comet 24P Schaumasse in the same field of view as galaxy NGC 4421 a slightly more diffuse object than the comet, which had a clear, concentrated nucleus.





I also found a lovely pair of galaxies nearby NGC 4302, long and edge on, abutted up against rounder, brighter NGC4298.



I tried the galaxy groups around Algieba in Leo. wow, so much clearer than the last observing night in the 20" with the Baader Mk IV zoom @~ 230x. Transparency must be good. Panning slowly W, I saw a glimpse of NGC3213 a small even glow at 13th magnitude (galaxy), before I got to the obvious and more striking NGC3226&7 (N down).



Next, I planned North from Algieba and eventually reached a bright star with two clear galaxies around it, then a third just out of the field, I couldn't work out where the fourth of this group was supposed to be, there was a hint of something making a lowercase t shape. NGCs 3185, 89 & 93 were seen clearly (aka Hickson 44 or Arp 316)



NGC2903, a favourite I always come to in the head of the Lion, was stunning and huge with a lot of structure. Rather like the picture below but fainter.

3I/ATLAS on the 20 inch telescope. Tracking it down, slowly, we all got to just about see a faint smudge in the right place. Amazing as it was quite faint and diffuse around 13 magnitude. It was a deep pleasure to witness this unique visitor, and the speed at which it crosses the solar system is about 3 times greater than most. It is destined to wander the Milky Way for many billion years and unlike most comets it will never be seen again. The smudge moved slightly as I attached my camera but the tracking was very poor so I only got one reasonable frame.



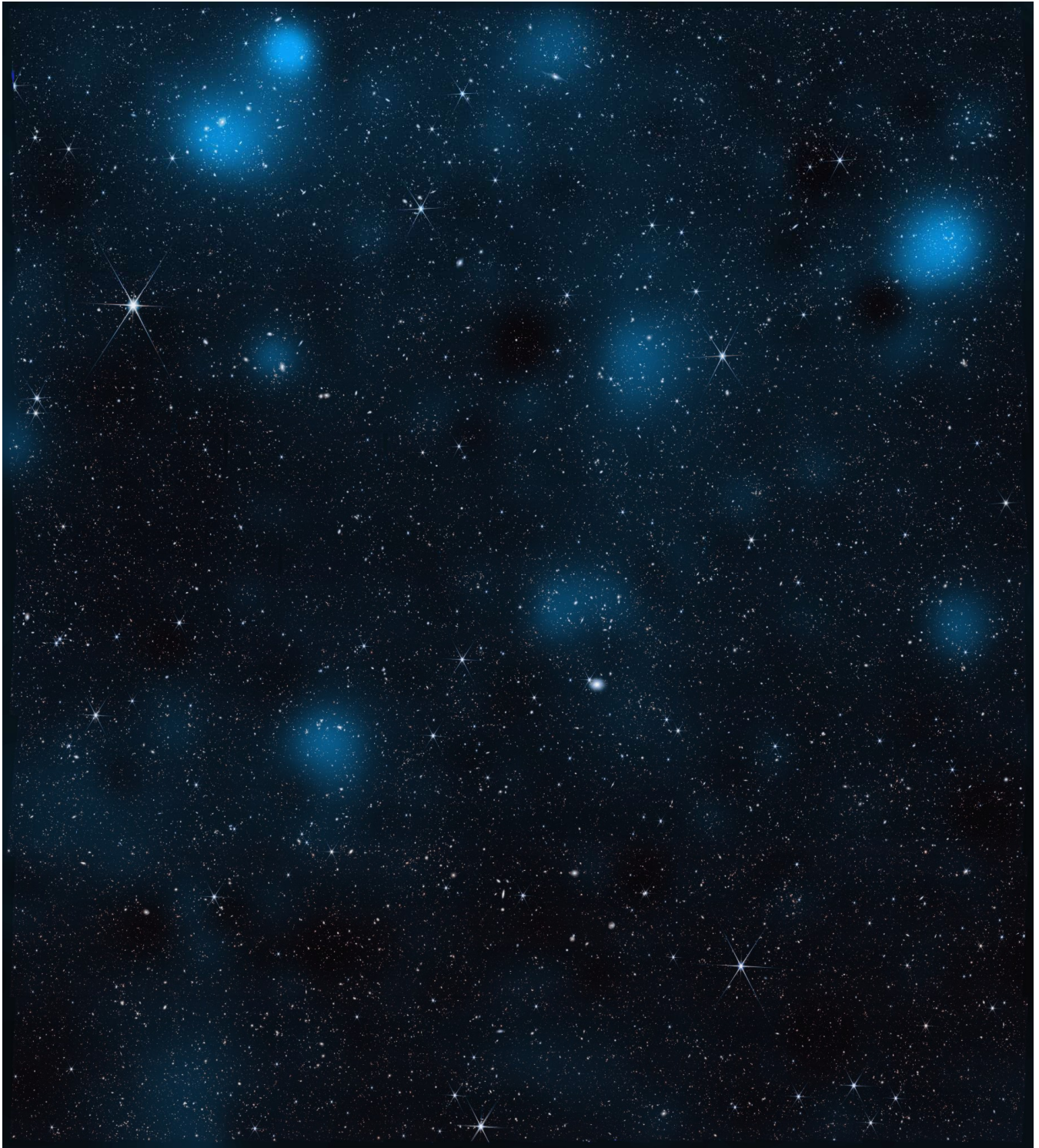
The sky was 20.85 which was bad for 2am. However the outer milky way was visible. I managed stars to 5.9 I think. The LED blue haze shows no domes on the horizon, instead, just a general worsening of the overhead brightness, as its blue components scatter more. Images my own, plus ocular view from Stellarium v21.

A later session during the clearer part of January three of us observed at long last the third interstellar visitor



Dan Self

NASA Reveals New Details About Dark Matter's Influence on Universe



Containing nearly 800,000 galaxies, this image from NASA's James Webb Space Telescope is overlaid with a map of dark matter, represented in blue. Researchers used Webb data to find the invisible substance via its gravitational influence on regular matter.

NASA/STScI/J. DePasquale/A. Pagan

With the Webb telescope's unprecedented sensitivity, scientists are learning more about dark matter's influence on stars, galaxies, and even planets like Earth.

Scientists using data from NASA's James Webb Space Telescope have made one of the most detailed, high-resolution maps of dark matter ever produced. It shows how the invisible, ghostly material overlaps and intertwines with "regular" matter, the stuff that makes up stars, galaxies, and everything we can see.

Published Monday, Jan. 26, in *Nature Astronomy*, the map builds on previous research to provide additional confirmation and new details about how dark matter has shaped the universe on the largest scales — galaxy clusters millions of light-years across — that ultimately give rise to galaxies, stars, and planets like Earth.

"This is the largest dark matter map we've made with Webb, and it's twice as sharp as any dark matter map made by other observatories," said Diana Scognamiglio, lead author of the paper and an astrophysicist at NASA's Jet Propulsion Laboratory in Southern California. "Previously, we were looking at a blurry picture of dark matter. Now we're seeing the invisible scaffolding of the universe in stunning detail, thanks to Webb's incredible resolution."

Dark matter doesn't emit, reflect, absorb, or even block light, and it passes through regular matter like a ghost. But it does interact with the universe through gravity, something the map shows with a new level of clarity. Evidence for this interaction lies in the degree of overlap between dark matter and regular matter. According to the paper's authors, Webb's observations confirm that this close alignment can't be a coincidence but, rather, is due to dark matter's gravity pulling regular matter toward it throughout cosmic history.

"Wherever we see a big cluster of thousands of galaxies, we also see an equally massive amount of dark matter in the same place. And when we see a thin string of regular matter connecting two of those clusters, we see a string of dark matter as well," said Richard Massey, an astrophysicist at Durham University in the United Kingdom and a coauthor of the new study. "It's not just that they have the same shapes. This map shows us that dark matter and regular matter have always been in the same place. They grew up together."

Closer look

Found in the constellation Sextans, the area covered by the new map is a section of sky about 2.5 times larger than the full Moon. A global community of scientists have observed this region with at least 15 ground- and space-based telescopes for the Cosmic Evolution Survey (COSMOS). Their goal: to precisely measure the location of regular matter here and then compare it to the location of dark matter. The first dark matter map of the area was made in 2007 using data from NASA's Hubble Space Telescope, a project led by Massey and JPL astrophysicist Jason Rhodes, a coauthor of the paper.

Webb peered at this region for a total of about 255 hours and identified nearly 800,000 galaxies, some of which were detected for the first time. Scognamiglio and her colleagues then looked for dark matter by observing how its mass curves space itself, which in turn bends the light traveling to Earth from distant galaxies. When observed by researchers, it's as if the light of those galaxies has passed through a warped windowpane.

The Webb map contains about 10 times more galaxies than maps of the area made by ground-based observatories and twice as many as Hubble's. It reveals new clumps of dark matter and captures a higher-resolution view of the areas previously seen by Hubble.

To refine measurements of the distance to many galaxies for the map, the team used Webb's Mid-Infrared Instrument (MIRI), designed and managed through launch by JPL, along with other space- and ground-based telescopes. The wavelengths that MIRI detects also make it adept at detecting galaxies obscured by cosmic dust clouds.

Why it matters

When the universe began, regular matter and dark matter were probably sparsely distributed. Scientists think dark matter began to clump together first and that those dark matter clumps then pulled together regular matter, creating regions with enough material for stars and galaxies to begin to form.

In this way, dark matter determined the large-scale distribution of galaxies in the universe. And by prompting galaxy and star formation to begin earlier than they would have otherwise, dark matter's influence also played a role in creating the conditions for planets to eventually form. That's because the first generations of stars were responsible for turning hydrogen and helium — which made up the vast majority of atoms in the early universe — into the rich array of elements that now

compose planets like Earth. In other words, dark matter provided more time for complex planets to form.

“This map provides stronger evidence that without dark matter, we might not have the elements in our galaxy that allowed life to appear,” said Rhodes. “Dark matter is not something we encounter in our everyday life on Earth, or even in our solar system, but it has definitely influenced us.”

Scognamiglio and some of her coauthors will also map dark matter with NASA’s upcoming Nancy Grace Roman Space Telescope over an area 4,400 times bigger than the COSMOS region. Roman’s primary science goals include learning more about dark matter’s fundamental properties and how they may or may not have changed over cosmic history. But Roman’s maps won’t beat Webb’s spatial resolution. More detailed looks at dark matter will be possible only with a next-generation telescope like the Habitable Worlds Observatory, NASA’s next astrophysics flagship concept.

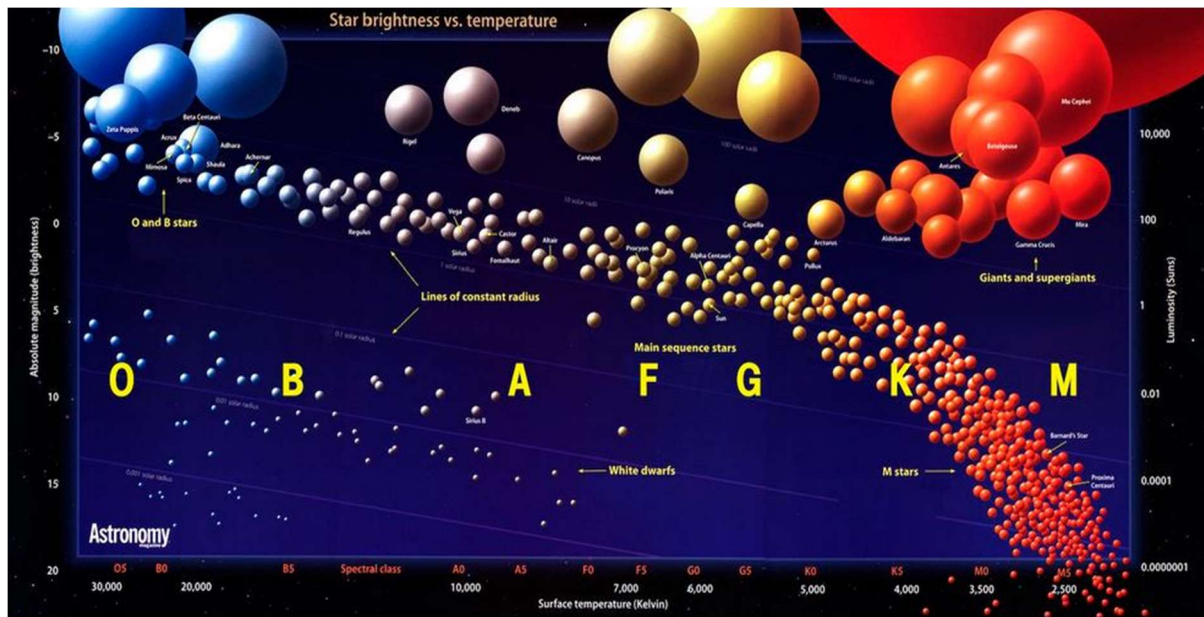
More about Webb

The James Webb Space Telescope is solving mysteries in our solar system, looking beyond to distant worlds around other stars, and probing the mysterious structures and origins of our universe and our place in it. Webb is an international program led by NASA with its partners, ESA (European Space Agency) and CSA (Canadian Space Agency).

To learn more about Webb, visit:

<https://science.nasa.gov/webb>

Classification of Stars



Stars are classified based on their spectral characteristics, temperature, luminosity, and size. The most widely used system is the Morgan-Keenan (MK) classification, which organises stars into spectral types O, B, A, F, G, K, and M, ranging from the hottest and brightest (O-type) to the coolest and dimmest (M-type). Each spectral type is further subdivided using numbers 0 to 9 to indicate temperature variations within the class.

In addition to spectral type, stars are also categorised by their luminosity class, which distinguishes between supergiants, giants, and main sequence (dwarf) stars. This comprehensive classification helps astronomers understand stellar evolution and the vast diversity of stars in the universe.

O-type Stars

O-type stars are the hottest and most massive stars in the MK classification system. Their surface temperatures typically exceed 30,000°C, and they emit a tremendous amount of ultraviolet radiation. These stars appear blue in colour and are often found in regions of active star formation, such as nebulae.

O-type stars have relatively short lifespans due to their rapid consumption of fuel, often lasting only a few million years. Despite their rarity in the galaxy, their intense energy output significantly

influences their surrounding environments, shaping the evolution of nearby stars and interstellar matter.

B-type Stars

B-type stars are slightly cooler and less massive than O-type stars, with surface temperatures ranging from about 10,000°C to 30,000°C. These stars are still very luminous and typically emit a blue-white light, making them prominent objects in the night sky. B-type stars are often found in young star clusters and can be identified by their strong hydrogen lines and the presence of neutral helium in their spectra.

Although they have longer lifespans than O-type stars, B-type stars still burn through their fuel relatively quickly, with lifespans of tens to hundreds of millions of years. Their intense radiation plays a crucial role in shaping their local environments, influencing the formation of new stars and contributing to the ionisation of surrounding interstellar gas.

A-type Stars

A-type stars are cooler than B-type stars, with surface temperatures typically ranging from 7,500°C to 10,000°C. They shine with a white or bluish-white hue and are well known for their prominent hydrogen absorption lines in their spectra. These stars are often found as main sequence stars and are commonly observed in the night sky, with Sirius being a notable example. A-type stars have moderate lifespans, lasting up to several hundred million years, and contribute to the ongoing chemical enrichment of their surroundings by eventually evolving into red giants.

F-type Stars

F-type stars are slightly cooler than A-type stars, with surface temperatures typically ranging from 6,000°C to 7,500°C. They emit a yellow-white light and are easily recognisable in the night sky due to their distinct spectral lines, which include both strong hydrogen and metallic features. F-type stars are often found in the main sequence phase, steadily fusing hydrogen in their cores.

These stars have lifespans of several billion years, making them somewhat longer-lived than their hotter counterparts. F-type stars contribute significantly to the ongoing evolution of galaxies, and some, like Procyon, are among the brightest stars visible from Earth. Their stable energy output and moderate temperatures also make them interesting targets in the search for potentially habitable exoplanets.

G-type Stars

G-type stars are cooler and less massive than F-type stars, with surface temperatures typically ranging from 5,300°C to 6,000°C. They emit a yellowish light and are perhaps best known for

including our own Sun as a prominent example. G-type stars are abundant in the galaxy and are frequently found in the main sequence phase, where they steadily fuse hydrogen into helium in their cores.

These stars have lifespans of around 10 billion years, allowing for the development of planetary systems with stable environments. Their steady and moderate energy output makes G-type stars particularly significant in the search for life beyond Earth, as their habitable zones are well suited for the presence of liquid water. In addition to the Sun, stars such as Alpha Centauri A are well-known representatives of this group.

K-type Stars

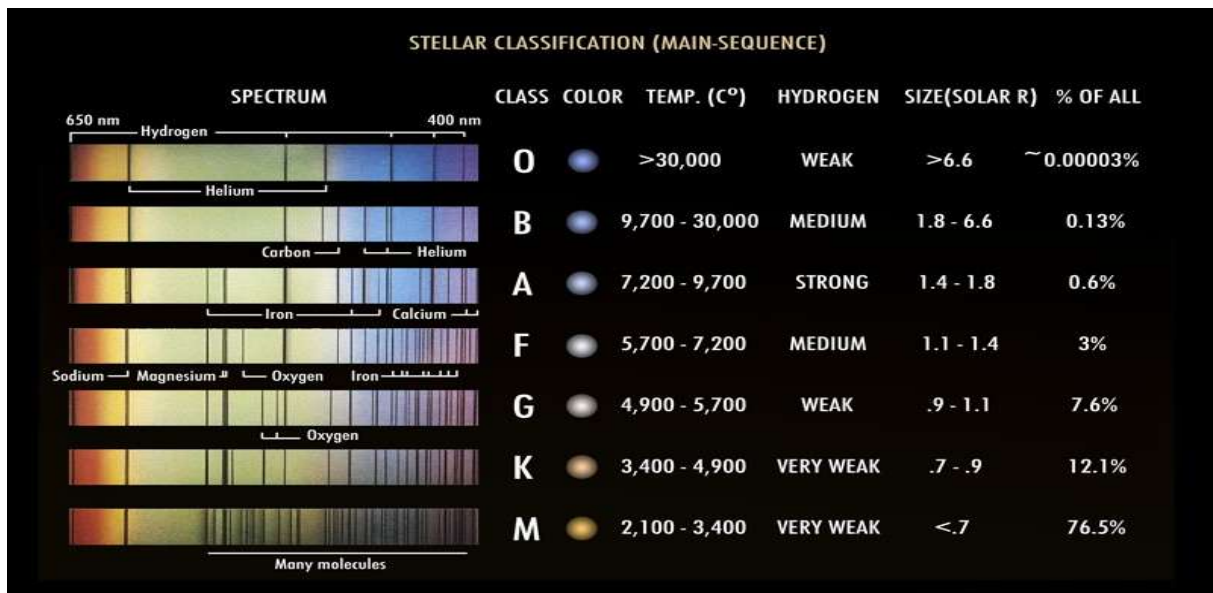
K-type stars are cooler and less massive than G-type stars, with surface temperatures typically ranging from 3,900°C to 5,300°C. These stars emit an orange or orange-red light, making them relatively easy to spot in the night sky. K-type stars are commonly found on the main sequence and are known for their well-defined metallic and molecular spectral lines.

With lifespans that can extend up to 30 billion years, K-type stars are among the longest-lived of all main sequence stars. Their stable energy output and wide habitable zones have made them of particular interest in the search for life beyond our Solar System. Notable examples include Alpha Centauri B and Epsilon Eridani.

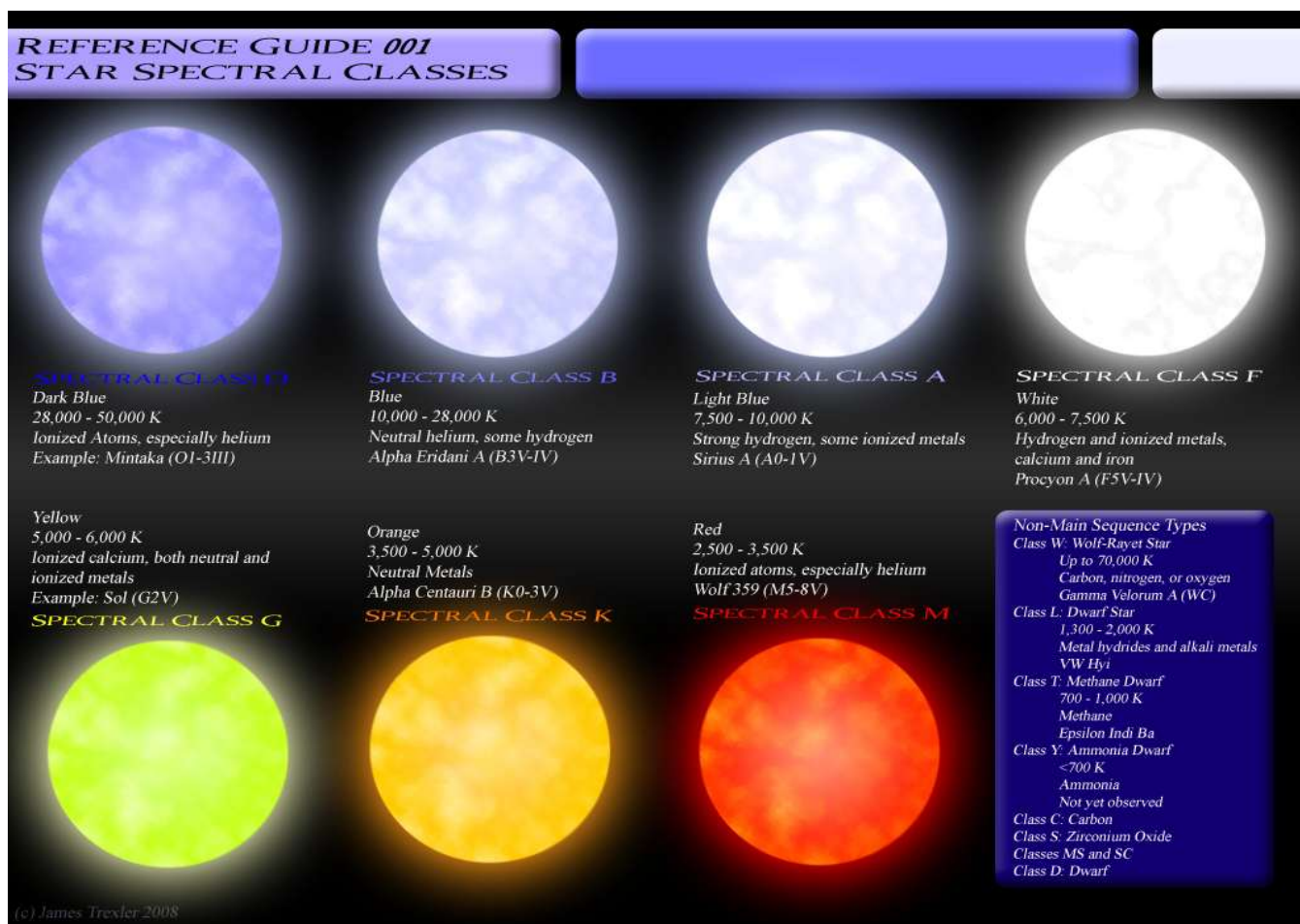
M-type Stars

M-type stars, also known as red dwarfs, are the coolest and least massive of the main sequence stars, with surface temperatures typically ranging from about 2,400°C to 3,900°C. They emit a faint red light, making them difficult to observe with the naked eye despite being the most numerous stars in our galaxy. M-type stars are characterised by strong molecular bands in their spectra, such as those of titanium oxide.

These stars are renowned for their extraordinary lifespans, often exceeding tens to even hundreds of billions of years, outlasting all other main sequence stars. Their low and steady energy output, along with extensive habitable zones, has led to significant interest in their potential for hosting exoplanets, some of which may be suitable for life. Examples of well-known M-type stars include Proxima Centauri and Barnard's Star.



Non-Main Sequence types



Class W Stars

Class W stars, more commonly referred to as Wolf-Rayet stars, are among the most luminous and massive stars in the universe. These stars are characterised by strong emission lines in their spectra, indicating the presence of highly ionised elements that have been driven into space by intense stellar winds. Wolf-Rayet stars are divided into several subtypes based on the dominant elements in their spectra: WN types show strong nitrogen emissions, WC types display carbon emissions, and the very rare WO types are marked by oxygen emissions.

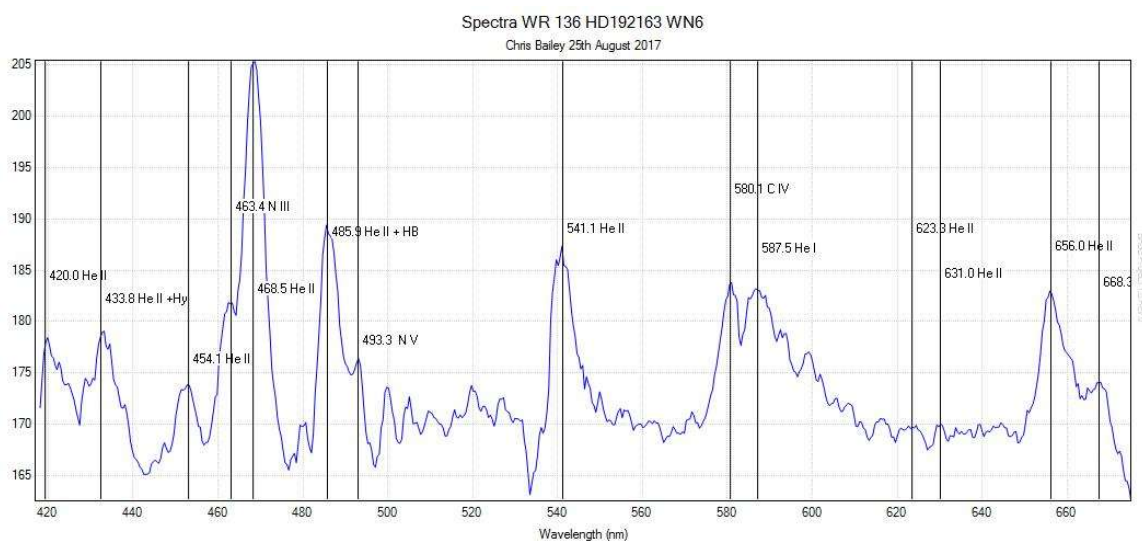
Wolf-Rayet stars are typically in a late stage of stellar evolution, having shed their outer layers and exposing their hot, dense cores. Their powerful winds and high temperatures make them important contributors to the chemical enrichment of the interstellar medium. Due to their instability and mass loss, Wolf-Rayet stars are thought to be precursors to supernova explosions, particularly in cases where they are found in binary systems or are surrounded by nebulae formed from expelled material.

There are 3 main spectral types of Wolf-Rayet stars and they are based on the composition of the star and what is the dominant gas contained within the star.

WN Wolf-Rayet stars with nitrogen emissions. (Subtypes dependent on whether H line exists)

WC Wolf-Rayet stars with carbon emissions (by partial helium fusion)

WO Wolf-Rayet stars with oxygen emissions (by complete helium fusion, very rare)



The above is a spectra of WR136 in the centre of the crescent nebula in Cygnus.



Image Chris Bailey

Class L Stars

Class L stars represent a relatively new and intriguing category in stellar classification. These objects are cooler and less massive than most main sequence stars, with surface temperatures ranging from about 1,300 to 2,000°C. Their spectra are dominated by metal hydrides and alkali metals, with very little visible light emission, making them appear faint and reddish in colour.

Many Class L stars are actually brown dwarfs—substellar objects that are not massive enough to sustain regular hydrogen fusion in their cores. They are often found in young star-forming regions and are identified through their distinctive infrared signatures. The discovery of Class L stars has expanded our understanding of the lower mass limit for stellar objects and the diversity of objects populating our galaxy.

Class T Stars

Class T stars, also known as T-type brown dwarfs, are among the coolest and least luminous objects classified in stellar taxonomy. With surface temperatures typically ranging from about 700 to 1,300°C, these objects emit almost exclusively in the infrared, making them invisible to the naked eye and difficult to detect with traditional optical telescopes. Their spectra are distinguished by prominent absorption features of methane and water vapour, further setting them apart from warmer star types.

T-type brown dwarfs do not sustain hydrogen fusion in their cores, but instead radiate residual heat from their formation and slow contraction. Most commonly found in the galactic neighbourhood, these elusive objects provide valuable insight into the lower boundary of stellar formation and the population of substellar bodies in our galaxy. Their discovery and study have

been crucial in expanding the understanding of objects bridging the gap between the coolest stars and giant planets.

Class Y Stars

Class Y stars, or Y-type brown dwarfs, represent the coldest category of substellar objects currently known. With surface temperatures falling below 700°C, these objects are even cooler than T-type brown dwarfs and emit almost all their energy in the far infrared spectrum. Their spectra are marked by pronounced absorption features from water vapour and ammonia, making them exceptionally challenging to observe with conventional telescopes.

Y-type brown dwarfs do not undergo hydrogen fusion and instead gradually cool over time, radiating only the faint residual heat left from their formation. Most discovered examples are nearby, hidden in the solar neighbourhood, and their study continues to push the boundaries of our understanding of the lowest-mass and coldest objects in the galaxy, as well as the transition between brown dwarfs and giant planets.

Chris Bailey

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/

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 or Aniket Sule at aniket.sule@gmail.com.

Best wishes,

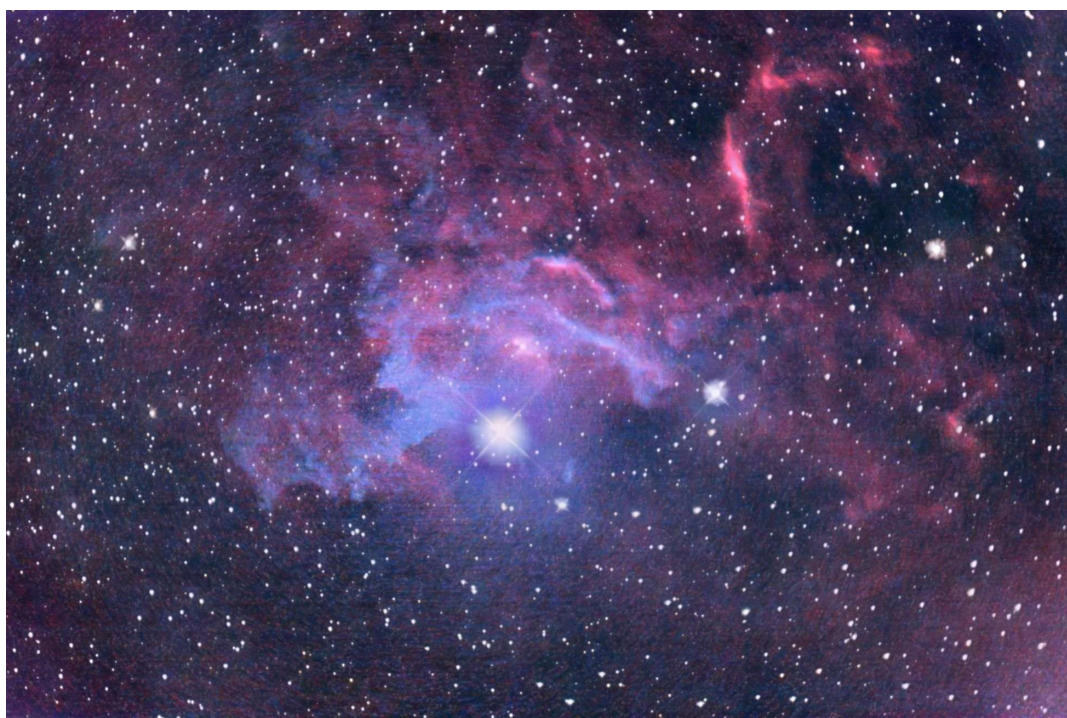
Tim Spuck, Pro-Am Working Group Co-Chair
Aniket Sule, Pro-Am Working Group Co-Chair

Members Astro-photographs.

Dan Self



Irregular Galaxy NGC 3109 in S Hydra 9X30sec Low altitude diffuse.



Flaming Star nebula in Auriga 15mins Lots of processing



31 ATLAS speeding past 30s



Two planetary nebula in Puppis M46 cluster 30X30s 20" Observatory telescope.

Mick Ladner



Chris Bell

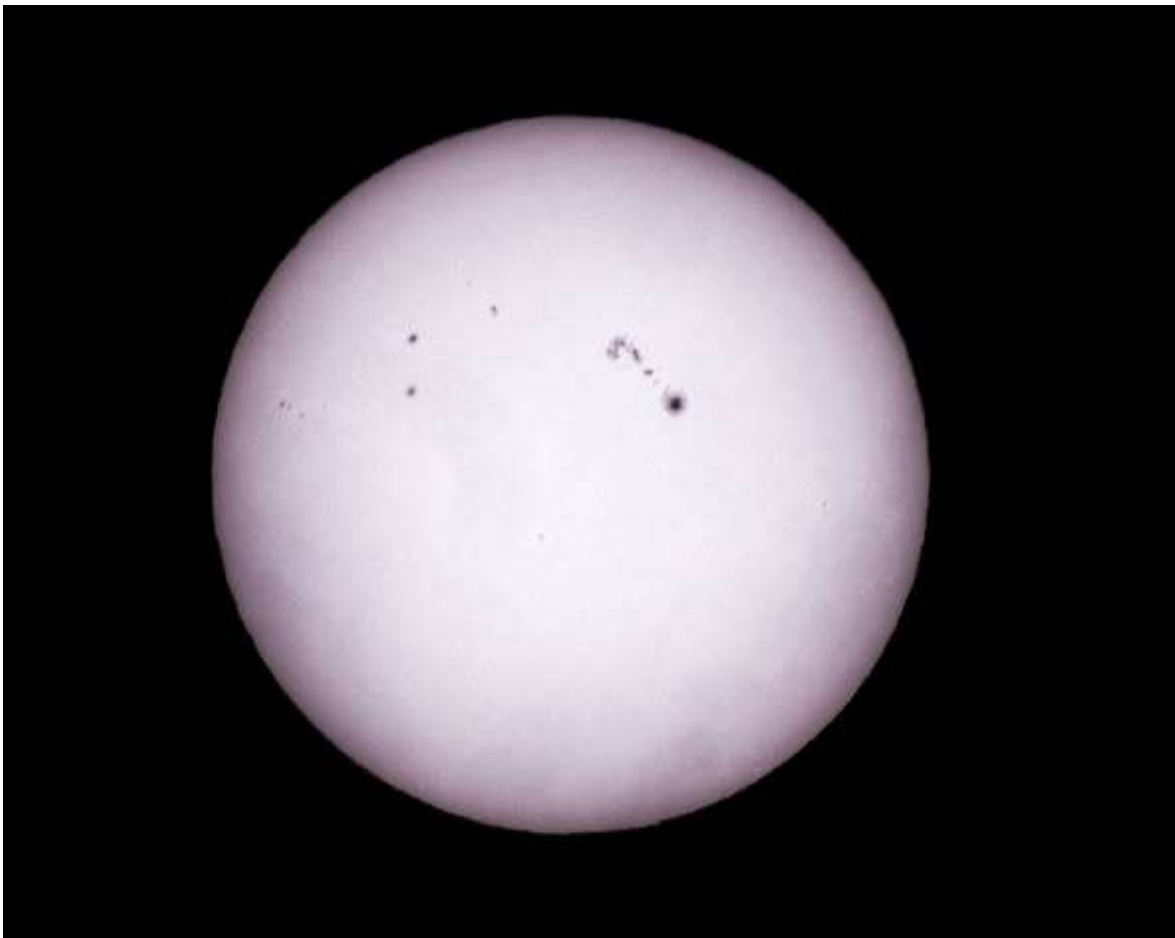


Comet 3I/ATLAS

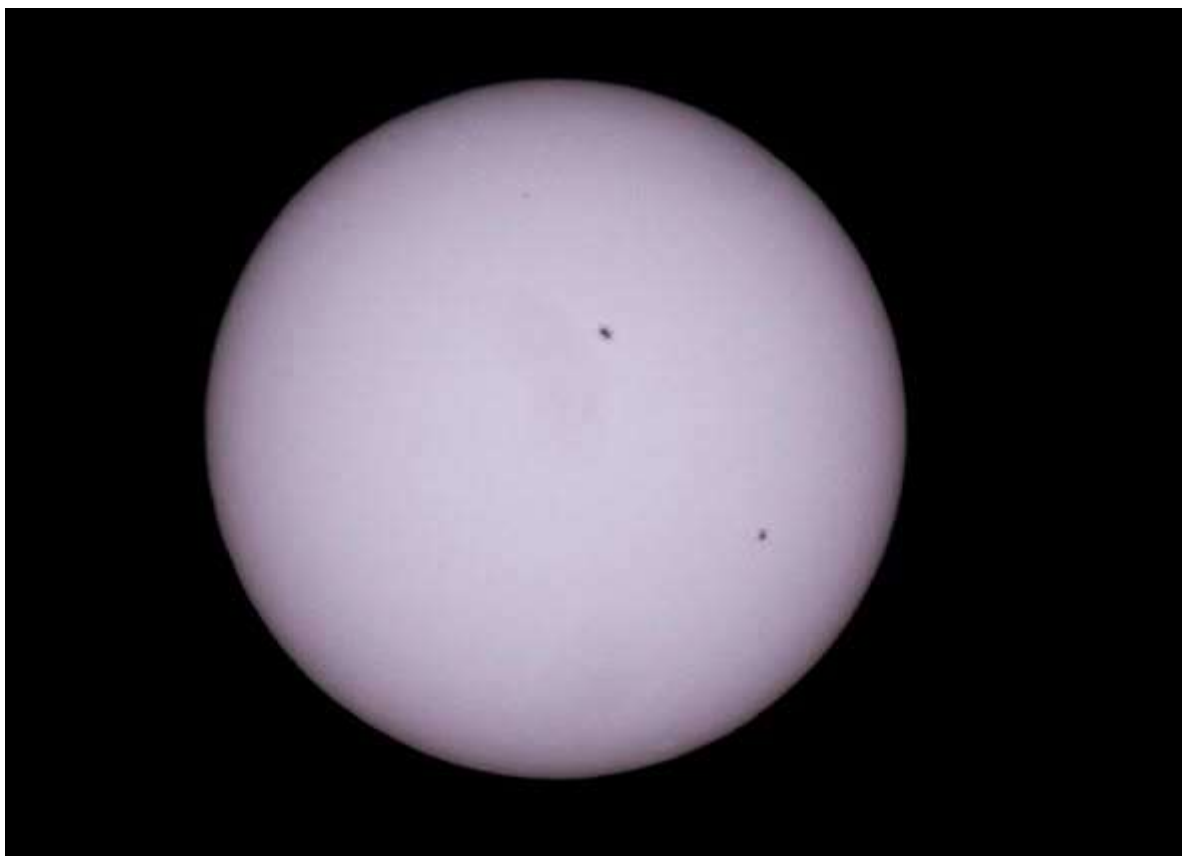
David Bryant

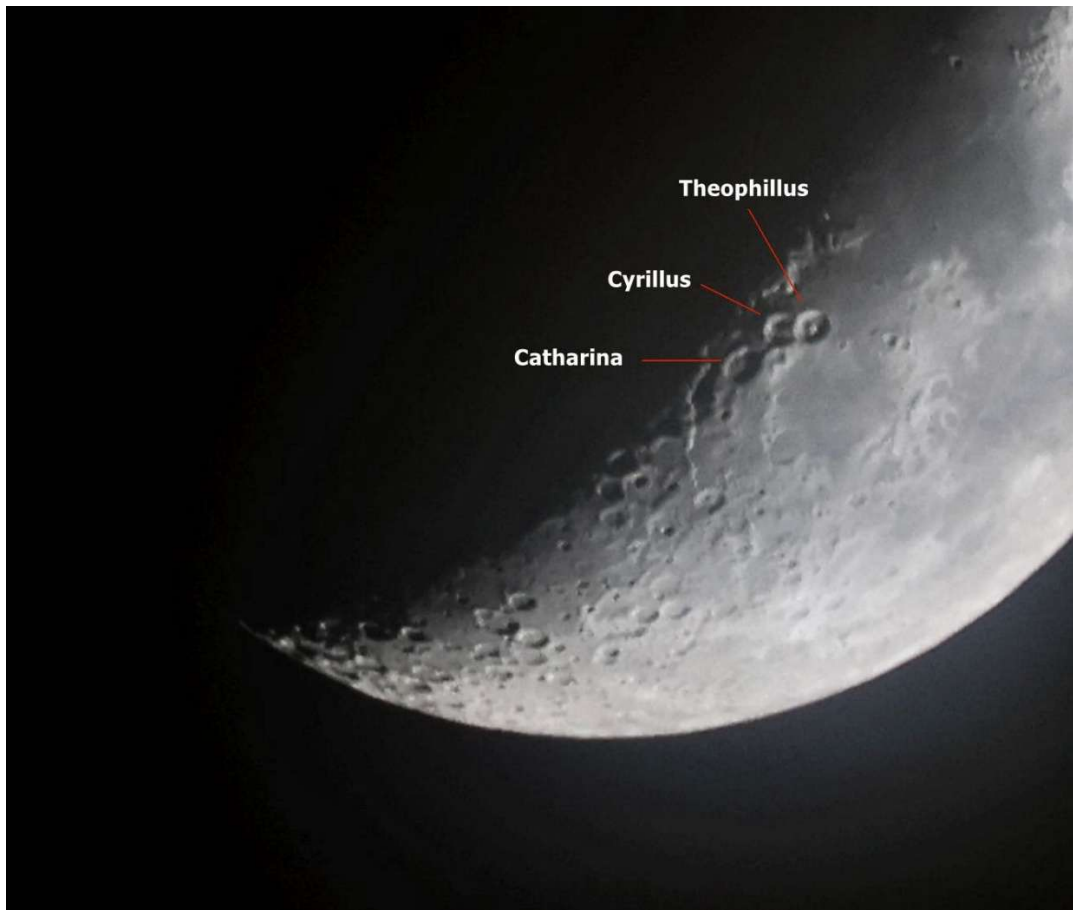












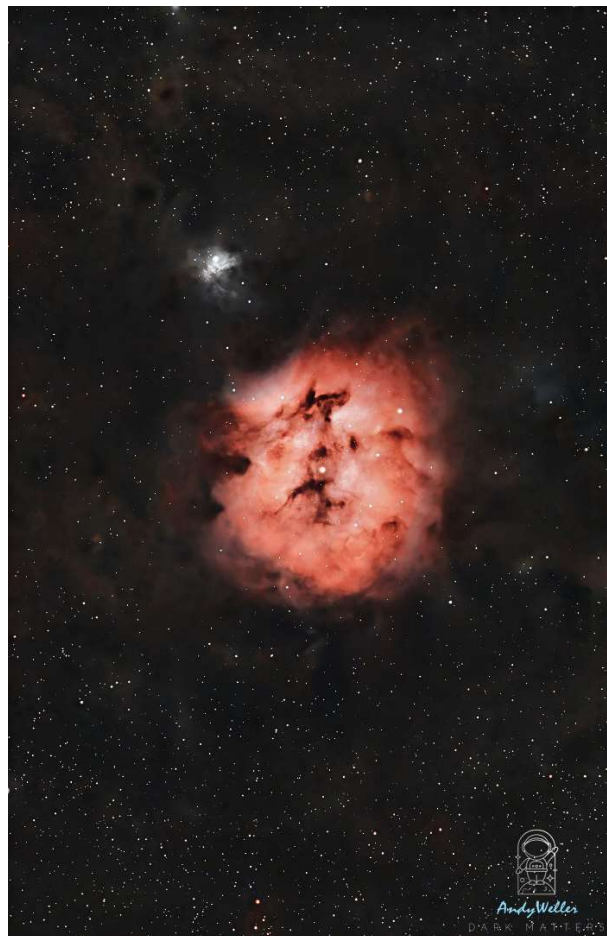


NGC 4631 - The Whale Galaxy in the constellation Canes Venatici about 30 million light years away.

C11 SCT @F/7



Cocoon Nebula through my 81mm refractor



Cocoon Nebula through my C11 SCT



The Tadpoles from my C11 SCT @F/7

Pat Goddard



M42 Orion Nebula. 10sec x 23 mins, Zwo Seestar S50.



The Horse Head Nebula *B33* Taken with Zwo Seestar S50 Smart Telescope.
60mins x 10sec stacked Seestar internal software post processed ZWO software.

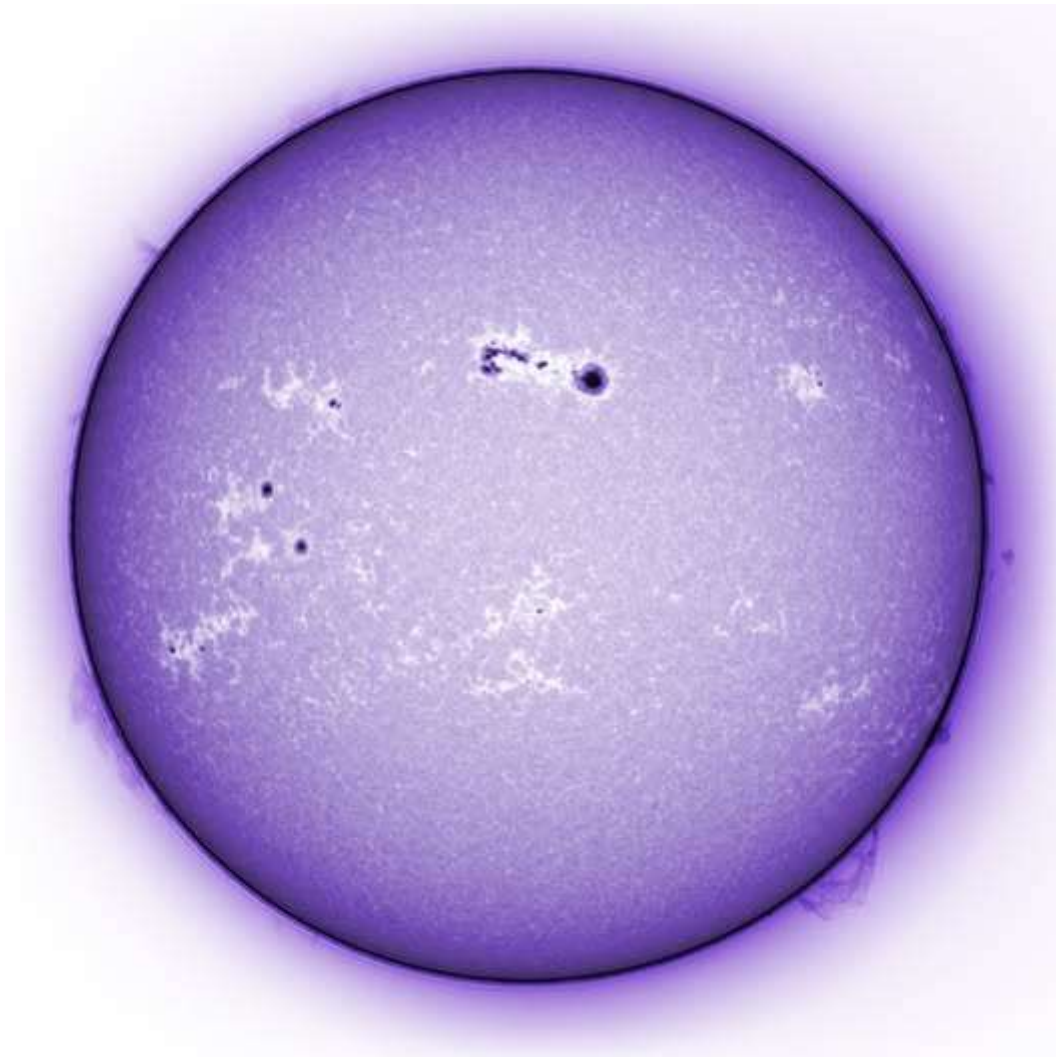
Martin Bulmer



Jupiter with Observatory 20inch







Sun in Calcium light.

William Optics GT71, Lunt Calcium-K B1200 filter, ZWO ASI174MM, Skywatcher Solarquest tracker

Chris Bailey



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

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 26th 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.



BRECKLAND ASTRONOMICAL SOCIETY

Charity No.1044478

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

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

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

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 ⁺ (Chairman), Keith Fowler (Treasurer), John Copsey (Secretary), Richard Harmon, Mark Humphrys, Justin Pearson. Trusted supervising members: Keith Morris, Mick Ladner, Peter Farmer, Chris Bailey, Pat Goddard, Gerald North, Andrew Luck. *DBS checked for day job. ⁺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 Telenegative 2x Barlow 1.25"

Telescope accessories:

William Optics AFR-IV Adjustable Flatteners 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 11/4"+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

Observatory/Visits Mick Ladner
Contact visitors@brecklandastro.org.uk

Webmaster Andrew Luck (temporary)
Contact webmaster@brecklandastro.org.uk

Newsletter Chris Bailey
Contact newsletter@brecklandastro.org.uk

Membership/Treasurer Keith Fowler
Contact treasurer@brecklandastro.org.uk

Secretary John Copsey
Contact 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 – 2026

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 March 13 th	Magnetars and Fast Radio Bursts	Dr Samuel Lander UEA
Friday March 27 th	Public Open Evenings	Observatory
Friday April 10 th	Smart Scopes	Dr Simon Bennett, The Widescreen Centre
Friday April 24 th	Public Open Evening	Observatory
Friday May 8 th	Solar Eclipses: Recent and Upcoming.	Jerry Workman G&L School Hammersmith
Friday June 12 th	Planetary Atmospheres	Prof Manoj Joshi UEA
Friday July 10 th	TBC	
Sunday August 9 th	Astro Barbeque and Perseid night	Observatory
Friday August 14 th	TBC	
Friday August 28 th	Public Open Evening	Observatory
Friday September 11 th	TBC	
Friday September 25 th	Public Open Evening	Observatory
Friday October 9 th	Women In Astronomy Part 2 (zoom)	Mary McIntyre FRAS
Friday October 30 th	Public Open Evening	Observatory