

Breckland Astronomical Society

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

EXTRA ***TERRESTRIAL***

Newsletter January 2026



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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.

Chris Bailey is the newsletter editor. newsletter@brecklandastro.org.uk

Mick Ladner is visitor organiser. visitors@brecklandastro.org.uk

Chairman's Notes

January February 2026

Welcome to 2026. Thanks for making 2025 a pretty happy and successful year for many of us. We are very grateful for increased membership and being able to socialise and rebuild our astro community, much of that thanks to a great team of volunteers. To encourage you to get out this year, we are running a photo competition for a 2027 astro calendar, with all astronomical subjects accepted particularly from new imagers, please post on our facebook group with label or tag saying competition, or send to chairman@brecklandastro.org.uk. Credit given for aesthetics, object interest, rare occurrence or composition.

Tuesday nights have had a steady return to popularity again. Some observing has been done despite typical weather. Pretty much all of the visits by groups this term have been scheduled on Tuesdays to catch the members. Open evenings were more manageable numbers 30-40 each time.

Of course I like to look back on the year, where we've had a great deal of inspired contributions and work from those connected with the society, so my great thanks go out to (and are not limited to) Chris for compiling 6 long and detailed newsletters, Keith Fowler for being very attentive to *all* the bookkeeping and finding time to do plenty of observing, whilst having a family to attend to, Keith Morris for putting in so much time at the 'dome' as we say, tidying, sorting, categorising, engineering, suggesting ideas for where to put X, Y and what to have, valuable input, Richard for expertise in engineering, installation, deep conversations, etc., Justin for being very useful, humorous, supportive and kind, giving a great welcome to folk, John likewise, Mark with IT expertise and giving quiet very sensible advice to a chairman who doesn't quite know what he's doing, Mick for doing an awful lot to help from such a distance, and getting so deeply back into astro-imaging, some great tech knowledge coming from you now, Malcolm thanks for a splendid super high quality talk at the start of the year, Gerry, Pat, Andrew, Robert, Simon, Tony, Stephen, Jade, all very pleasant and stimulating company – such a wealth of knowledge. Also good to see Peter popping back when you can. And thanks to all the talk attendees – we need to you keep telling your friends how great spending a Friday night learning astronomy can be! Wishing you all a very merry 2026 and clear skies.

Now for a look at what's coming up in the sky.

The Solar System

The Moon starts out 2026 near full. The Cold Moon. By the 8th it will be approaching last quarter and rises at 22:45, setting much later each successive night.

Catch the new crescent on the 22nd or 23rd near Saturn in the South Western sky.

Lunar X should be visible by day on the 25th January from lunchtime but will be past its best by dark.

After the Full moon on the 1st February, dark skies come again to evenings from Friday the 6th February

The Lunar X in February may be noticeable very late on the evening of the 23rd February as the moon sets next to the Pleiades. A nice refractor or decent camera lens opportunity.

Mercury has an evening viewing opportunity in February from about the 9th when brightest and rises and fades a little, it should be visible until about the 28th with Venus approaching it.

Venus is emerging slowly from Solar conjunction and will appear in the evening sky at the start of March, passing Saturn.

Jupiter rises 9pm on 1/11 and 5pm at the end of the year 31/12. I have listed here some of its moon events:

Jupiter

Jupiter is at opposition on the 9th-10th January so appears very bright and close and is the largest planet in a telescopes. It is 4.232 AU from Earth, 5.215 AU from the Sun. The moons pass each other and from our perspective undergo rather elegant looking juxtapositions. If you want a feel of the clockwork of the heavens, that Galileo Galilei observed first in 1609, just take time to observe Jupiter in any size telescope. The larger the better, cameras optional. The phenomena described below have timings and details of what is occurring. I have picked the most interesting as there are so many in this 2 month period. I have not included Great Red Spot passes as it rotates in 9hrs 55 minutes, so you can usually catch a view of it most nights if one is patient.

The Galilean moons have a resolvable size under good seeing, Ganymede the largest moon in the solar system, has an angular diameter of 1.7 arc seconds at a distance of 4.2 A.U. This is just a bit less than Neptune 2.3 arc seconds.

On February 16th Jupiter passes ½ a degree North of R Geminorum, a Mira variable that should be starting the year at 13th magnitude and predicted to rise hugely in brightness to 7th magnitude by the start of April.

If you want a deep dive into Jupiter, a great video explaining its interior can be found here:

<https://youtu.be/FXF-nD4U5zk>

Moon phenomena: (times 00:00-06:00 correspond to the morning of that date) in GMT

- Jan 1 Callisto goes into shadow 20:04
- Jan 2 Europa goes into shadow 20:12
- Jan 6 Io+shadow transit 01:50-04:13 close as near opposition
- Jan 6 Io goes into shadow 23:10
- Jan 7 Ganymede+shadow transit 02:00-05:41 (large)
- Jan 7 Io+shadow transit 2019-2239 very close as near opposition
- Jan 9 Europa goes into shadow near limb as at opposition 2247
- Jan 10 Ganymede reemerges from shadow near limb as at opposition 1912
- Jan 11 Europa+shadow transit 17:51-20:46

Jan 13 Io+shadow transit 03:40-06:00
 Jan 14 Ganymede transit 05:35
 Jan 14-15 Io+shadow transit 22:06-23:21
 Jan 16 Io+shadow transit 16:30-18:37
 Jan 16 Europa and Io pass each other 21:39
 Jan 17 Europa reemerges from shadow 04:10
 Jan 17 Ganymede disappears 19:05 reemerges 23:08 from shadow
 Jan 18 Callisto reemerges from shadow 18:05
 Jan 18 Europa+shadow transit 20:04-23:21
 Jan 20 Europa reemerges from shadow 17:27
 Jan 21-22 Io+shadow transit 23:50-02:23
 Jan 22 Io reemerges from shadow 23:42
 Jan 23 Io+shadow transit 18:16-20:52
 Jan 25 Ganymede disappears 22:18 reemerges 03:08 from shadow
 Jan 27-28 Callisto transit 21:05-01:07 Callisto's shadow 00:59-05:03
 Jan 27 Europa reemerges from shadow 20:03
 Jan 29 Io transit 01:35-04:16
 Jan 30 Io reemerges from shadow 01:36
 Jan 30 Io+shadow transit 20:01-22:46
 Jan 31 Io reemerges from shadow 20:05
 Feb 1 Ganymede disappears 01:39
 Feb 2 Europa+shadow transit 00:38-04:32
 Feb 3 Europa disappears 18:39 reemerges 22:39 from shadow
 Feb 4 Callisto disappears 02:29
 Feb 5 Io transits 03:20-set
 Feb 6-7 Io+shadow transit 21:46-00:41
 Feb 7 Io disappears 19:07-22:00
 Feb 8 Io shadow transit 16:56 (daylight) – 19:07
 Feb 9 Europa+shadow transit 02:55-set
 Feb 10-11 Europa disappearance 20:57 reappearance 01:16 from shadow
 Feb 11-12 Ganymede transit 18:53-22:12 shadow transit 21:56-01:17
 Feb 12 **Io Europa Callisto conjunction + Callisto shadow 2300 all evening 20:00 best
 Feb 13-14 Io+shadow transit 23:33-02:34
 Feb 15 Io+shadow transit 21:02 Ganymede and Europa conjunction 21:19
 Feb 18-19 Ganymede and then shadow transit 22:24-02:01-
 Feb 19 Europa+shadow transit 18:25-22:58
 Feb 20 Callisto reemerges 21:31 GRS central
 Feb 21 Io and Callisto conjunction before Callisto passes into shadow 00:12
 Feb 21 Io+shadow transit 01:20-02:17-
 Feb 22 Io+shadow transit 19:48-22:55
 Feb 26 Ganymede transit 01:59-

Feb 26-27 Europa+shadow transit 20:52-01:33

Feb 28 Europa reemerges from shadow 19:49

Mar 1 Ganymede goes into shadow 19:49

Mar 1 Io starts to transit 21:39

Himalia (Jupiter VI) is 14.8 magnitude and about a degree from Jupiter, appearing as a faint star, in very large telescopes, if you know exactly where to look. It has a long orbital period. The other outer moons Sinope, 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.

Another 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 18:17 January 1st slowly reaching 22:26 on February 28th 2026. In January it is 14.0 magnitude, totally lost in the glare of the -2.7 magnitude planet. This fades to 14.3 magnitude gradually during February. It needs careful techniques to image with good clean optics and high focal length.

Saturn

Saturn is receding a little and the rings are opening slightly again, we had a really thin view of them in November, this is part of a near 15 year cycle.

Due to the ring and moon orbital plane being so edge on to us. Titan transits across the disc. This is hard to catch and is a rare phenomenon.

Titan passes in front of Saturn from Sunset on Friday January 9th 16:55 – until it sets 22:00

And similarly 16 days later (its orbital period is almost an exact multiple of Earths day) on January 25th 17:20.

It also does this on February 10th but this time Earth is more out of the orbital plane and it grazes the pole of the planet at about 19:30 – but the planet is now quite low. Dione is also crossing the disk with its shadow.

Titan emerges from behind Saturn on the evening of January 17th at 20:40

And similarly 16 days later on 2nd February more slowly due to it being near the pole 19:38-20:00, although it is lower in the sky.

After this there are no more Titan passes for 15 years!

Uranus – is visible near the Pleiades, almost at naked eye brightness

Neptune - Neptune is about a degree above Saturn. It is now getting lower into the sky during mid evening, but can be seen well after sunset. The two planets being quite close again.

Meteors

Quadrantids meteors are active from the start of the year until Jan 5th or so. Catch them best really early in the morning, before dawn ideally on the 3rd or 4th, but they can be visible from a dark spot at 5:30 or 6pm. However the shower should be difficult to see this year due to the moon.

Comets

Comet 3I/ATLAS has just passed the closest point to Earth but it moves from morning sky to evening and a better position into January, while fading as it sails away from us at incredible speed, forever! It is really distant and consequently, very faint! Taking a picture in a telescope may give you a better chance of seeing it, if this is within your capabilities, if not try visiting our observatory.

Much brighter is comet 24P/Schaumasse reaches perihelion about 1.6 AU from the sun, outside of Earth's orbit, so we have a good view of it in our night sky. It starts the year in Virgo, at 9th magnitude or a little brighter, but view it during dark skies in the late evenings, midnight or later ideally, when it gets a little higher off the East horizon in Virgo, near Arcturus. It has been among the Virgo galaxy cluster at the end of 2025. Now it moves slowly North of the Ecliptic, left against the stars, increasing in Right Ascension, towards Serpens Cauda, keeping in a similar position above the horizon every night during the period.

It is joined slowly from the South by another 210P/Christensen but won't get close to and higher in the sky until later in spring.

Asteroids

1 Ceres is visible just upper left of Saturn but is more distant and faint, looking stellar.

At the end of February asteroid 7 Iris reaches its brightest 8.75mag in Sextans.

10 Hygeia is a couple of degrees N of the Crab Nebula, M1 in Taurus but is fairly small and distant (3AU)

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

See below at the talk section for a list of planetary nebulae to look for after Keith's talk. Charts can be found on in-the-sky.org but I find the best looking ones are either Stellarium Web, or by downloading onto a laptop Stellarium from stellarium.org version 21 or better. It can hold millions of stars and thousands of deep sky objects.

Multiple Star of the month

Beta monocerotis – is a triple with a total magnitude of 3.74 – it actually outshines alpha Mon. Made up of stars A magnitude 4.60 B4 , B mag 5.00 B2 and C mag 5.32 B3 all the same blue-white colour. They lie about 700 light years away, so all are intrinsically bright, each over 1000 times the luminosity of the Sun!

Their separation is 7" and 3" approximately in a straight line – they are in a very slow orbital dance. There is a background star at mag 12.2 25" away from them.

Of course try any of the bright stars with a new telescope. Rigel can be found to have a companion – usually this is hard to find. Algieba in the Lion's Neck (Leo) is a golden double. Porphyrion in the bowl of Virgo, another very clear, neat, bright double. And iota Cancri – see observation section below.

Mira stars (variables)

R Leporis is even fainter than usual, in rather a minimum, its cycle is a bit over an earth year, and that means it will be bottoming out at about magnitude 10. It is rather irregular and so if you get a good estimate of its brightness, by comparing with surrounding stars, the BAA or AAVSO would be interested in the visual information. A medium sized telescope would be ideal, rather than a large one that reveals the blood red hue as this may distort the perceived brightness.

The archetype Mira variable, Mira or omicron Ceti lies in the middle of the Sea Monster constellation near galaxy M77 and it is brightening rapidly right now at the time of writing, 24th December. By 1st January it should be at least magnitude 4 perhaps reaching 3 or better. So cast your eye, not your telescope toward Cetus after dark. Its period is about 11 months. I wonder how obvious it will be this year. I must confess I haven't tried to look yet.

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

Observations

Last February

A missed one from February 2025 which would serve as a good list of objects to explore in a telescope this February. Recorded on the 4th Feb 2025 at 23:00-00:30 using the 20" telescope f/4.5 and a Baader zoom eyepiece mkIV 8-24mm magnifying 100-300x. There was a 45+% moon up in the West making the sky bright, but it was transparent.

Star "Tegmine" in Cancer – is a triple star that we split Aa Ab after some looking time!

Iota Cancri is very wide by comparison and blue yellow colours

Beta Monocerotis is lovely clear triple – well worth a look! How did we miss this.

Hubble's Variable Nebula NGC2261 v nice despite the moon. Nice cometary structure.

M78 slightly out of the field and patches were appearing on guidescope camera to SW these were R/IR wavelengths that show up on camera but invisible in telescope. Also stars were missing from view. dark nebula reddening effect. The nebula was affected visually by the sky and it seemed washed out somewhat.

NGC2022 planetary near lambda Orionis (the head star) – a clear small hole in centre possible central star in it. Needed magnification.

NGC 2381&2 I think the double bubble planetary in Gemini. Pretty clear – it is quite faint and elongated but too dim to see clearly the exact shape.

(I guess we'd seen too much of NGC 2392 the Eskimo – which is significantly brighter)

We turned to Leo and found Regulus and slewed along to the east (left) we found another faint NGC galaxy 3338, which was seen very well despite it being magnitude 12.1 and we then went down to M105. This had two galaxies near it in a v shape, NGC 3384 and 3389. The latter was more elongated and diffuse but both were seen OK. In fact 3384 looked equally bright with M105.

It was quite a pan across to M96 and M95, both of which showed more structure.

Then we went across to the Leo triplet by finding star Chertan (theta Leonis, mag3.3 165ly) and panning down. However rather than the triplet we stumbled across on Cartes du Ciel another fainter galaxy NGC 3596 which was well seen at mag11.5

The main Leo triplet was very nice showing good detail despite the moon being well up in the sky. Especially NGC3628 with the two halves like a sandwich visible when using a lot of averted vision. It filled the eyepiece almost. Panning across a bit showed up another easily visible galaxy NGC3593 bringing our total in this area to a quintet rather than a triplet.

Going down the back leg of Leo we spotted another couple on the map, one invisible NGC3640 rather just hard to find and another NGC3521 that showed up very well. It was surprisingly bright in fact.

There are so many galaxies around this region of the sky, it is hard to become familiar with them, it makes one realise there is a wealth of information easily accessible about the Universe.

Pre Christmas 2025 20 inch telescope from Great Ellingham

On this occasion I was specifically looking for the object called "Andromeda's parachute" I discovered via Cloudy Nights forum. It took a large telescope to discover that it was a gravitationally lensed quasar, in recent decades. On closer inspection, with advances in astrophotography, it was revealed that it was three small images of the same thing at max 15.4magnitude (faint!) and one of 17.7magnitude (Very faint!) on the other side of an essentially invisible galaxy causing the lens effect, lying about 7 billion light years away. The quasar itself, a most powerful emission of a super massive black hole, lies 11 billion light years away with a redshift of about 2.34. What a crazy distance, I wondered if I could see it by eye. It turned out once I found the area the dot appeared after just a few seconds! But I could only see a single faint stellar dot, even at 300x. Apparently it has been seen as an extended line in a 30 inch telescope. See my image in the images section. A new record for my eyes!

Post Christmas 2025 session – 8 inch telescope from city

It looked very clear at 2am Dec 26th 2025. It was nippy, about 3 degrees. But the 'haze' from LEDs was unquantifiable by eye. I started looking for the galaxies in Leo. I planned around M65 and 66 (I can never tell which) did eventually come into the eyepiece, but very subtly. It may have been lack of dark

adaptation but was probably more light pollution. I couldn't get out to a darker place as I was too tired. It was very transparent compared to normal though.

I tried looking for the fainter galaxies near Algieba, the golden double star in Leo. One pair East and one group North. Neither were definitely visible. OK I had to pare back my target list. Even though the streetlights were off there was a lot of background light here.

I found the double cluster, (all this at 78x with my 8 inch). Cluster M35 was good also, filling the view, with a perceptible smudge off to the side which was the background cluster behind it.

Jupiter was very bright and clear with all 4 Galilean moons splayed out around it. There was a hint of a gap in the NEB and SEB towards the side but no clear red spot.

Very close was the Eskimo nebula, easily found.

I turned to double (triple) star Tegmine in Cancer and could quite split the third component at this magnification.

Next, I went back to Leo to look for NGC2903, which I took ages to find but did get it eventually. It was fairly large looking.

I tried M3 but couldn't find it at first. I pan backwards three lengths from the ruler between Cor Caroli and the nearby star. This is a long hop and so takes some time. Anyway, a tiny wisp of coastal cloud had crept across while I was looking.

M97 and M108 were impossible also, so I tried harder and found M3 which appeared very clearly. Almost resolving, it looked elliptical somewhat.

I shifted the scope to find NGC 3242 'the ghost of Jupiter' in Hydra. This was easy to see, but quite a bit smaller than Jupiter. Then I looked in Virgo between stars Vindemiatrix and Denebola and really quickly saw a pair of galaxies in Markarians chain. I should have known to look for comet Schaumasse near M100 as I was using Stellarium web and this appeared on my screen after I dismantled my scope. Moral: plan your session properly!

Post Christmas 2025 session 2 – 20 inch telescope from Great Ellingham

Another very clear night Dec 27th 2am at the Observatory. After imaging session. Saw comet 24P Schaumasse in the same field of view as 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 in the 20" with the Baader Mk IV zoom at about 230x.

Panning slowly West 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.

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.

NGC 2903 was stunning and huge with a lot of structure. Then I couldn't resist checking out a wide group of galaxies around M106, M95 and M96. But these were just many fuzzy blobs - ellipticals mainly.

The sky brightness overhead was 20.85 which was quite poor 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.

Happy sky surfing and telescope testing!

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

Talks

November Talk - Kuiper Belts Around Other Stars

Dr Tim Pearce is a Stephen Hawking fellow from the University of Warwick. Tim opened with a fine description of our solar system's Kuiper belt. We then looked at some fuzzy false colour images of 28 other dust belts around stars (from Matrà et al 2025). They're only a couple of arc seconds in size! They are ALMA sub-millimetre telescope images. JWST has also imaged the belt around Star Fomalhaut. This is the one Hubble had once claimed to discover a planet around.

A NASA JPL Caltech sketched cartoon was used to describe how planetesimals form, collide and leave the dust. Then planets produce resonance which collects the dust into rings. We can't see (from Earth) the planets, just the dust rings – they glow much more strongly, than the feeble light reflected in the glare of the parent star. It's about the dispersion into much more finer particles. For instance, Saturn's ring is bright but has a mass much less than the moon Mimas, which is near invisible on a correctly exposed photo. The huge area reflects, scatters and emits light.

We see a graph of a star's light curve with a dip in light for some time period, that looks like a shark fin. This was caused by a comet passing another star! Wow!!!!!! It's amazing what we can detect.

But, there is a caveat. Dust only lasts about a million years before dispersing and condensing so there must be a constant supply of dust to produce these rings. The latest model is called the Collision Cascade. The dust is eventually Blown Out of the system by the solar wind. He did the data analysis! © T. Pearce

And on his plot, he puts our solar system. It is an anomaly! Our Kuiper belt is much lower mass than it should be, statistically. This may be due to Neptune having an influence or another aspect of the theoretical model is *stirring*. Self-stirring by gravity from "Plutoids" is one possibility. The other is flyby-stirring by passing stars. But the most likely one is by Planets.

Tim is looking at how Planets interact with these belts. Clear zones denote planets. Tim can infer where and what type of planets are there by looking at the dust! Amazing we can get information about this! He

works on an independent and very complementary way of discovering exoplanets that provides more outer planetary system information.

We see a Hubble image of an edge on belt showing warping. The simplest model to explain this warp is a planet on a tilted orbit. They revisited it with SOFIA and spotted the planet close to the star in angle. The model prediction was borne out.

Another system showed two concentric disks and they inferred a planet. Tims group actually got time on JWST to look at this. Wow!!! This is precious telescope time given only to the top 10% of proposals. They also found a belt offset on an elliptical orbit. They worked out a planet orbit and got some JWST time for this, too!

So why do we care? Well the talk is a bit Graph heavy with log-log plots etc. But with no lack of accuracy or apparent dumbing down he explained the axes of the plots well so we could all understand how this builds the complete picture of exostellar systems. These would be invisible by other methods! It's amazing how the information he has found fills the graph space and visually we can see how the information is so useful. To summarise. Overall - a new area of discovery with new eyes.

There were some really good Questions with plenty of time devoted to them. Plus lots of people afterwards at the observatory with him. There was a pretty good attendance too.

December's Talk – Keith Fowler on Planetary Nebulae

Attendance 26

There were NGC and Messier dairy milks for prizes. Amazing! I loved the idea.

The talk title opened with a quote from Babylon 5 - Susan Ivanova: **No boom today**. Boom tomorrow. There's always a boom tomorrow. What? Look, somebody's got to have some damn perspective around here! Boom. This was the first question.

Next we saw M57 in Lyra, which was Keith's first deep sky object as viewed from Tottenham!

Messier only discovered 4 Planetary Nebulae: M57 ring, M97 owl, M27 dumbbell & M76 little dumbbell. The NGC catalogue contains 6000 galaxies and 90 Planetary Nebulae. Including NGC6543 - cats eye and NGC6826 blinking and NGC7009 saturn. we were looking at NGC1535 the night before the talk - It is called Cleopatra's eye. It is an emission nebula with a white dwarf at the centre – see later on in the edition for more about white dwarves.

The term "Planetary Nebula" came from William Herschel. His Symphony 14 in D major was playing when we arrived in the hall! Music was his initial passion when he came over to England and then got interested in astronomy and mirror grinding. He worked from Slough & built huge telescopes.

They're not very bright. Absolute magnitude of an object is a measure of its intrinsic brightness as viewed from 31 light years away (10 parsecs – a standard distance).

Globular clusters are -7 magnitude, Open Clusters -2, Galaxies -22 (we can't actually view one from 10 parsecs away) but planetary nebulae are only +3, very dim. Especially as the magnitude scale is a logarithmic scale, or exponential – every +5 is 1/100 x fainter, or 1% of the luminosity. This feeble brightness is because they have little mass and no fusion power. The light coming off is emission lines from the gas fluorescing.

We had a really clear diagram of this showing spectrums. We even got a Jablonsky diagram! Showing the energy levels of the atoms.

Another reason we don't have very many of these objects is because they don't last long! Stars live billions of years but the nebula phase is only 10-50 000 years. We can even detect their expansion as they are so short lived (on cosmic timescales). They aren't very big either only 0.1-3 light years.

William Huggins discovered what they were made of. He wasn't flamboyant. He was factual and played around with spectrographs and astro photography. He built his own observatory and got a spectrum of the Cats Eye Nebula. He identified hydrogen nitrogen barium and magnesium but then.. what was that weird line, really strong. They tended to think, sceptically that it was an unknown element called Nebulium. Ira Bowen worked out it was a forbidden line we can't produce on earth. This was oxygen in an extremely rarefied form. Now called O III.

Astronomers know it well now.

We got another spectrum of NGC 7027 Cygnus. Compared to H and He spectra.

How to make a Planetary Nebula:

Step 1 make a star. Molecular cloud condenses until dense enough for fusion. Then a balance of fusion radiation pushing outward and gravity onward forms a star.

Step 2, wait a while!.

Step 3. Wait longer. Boom. It ignites hydrogen fusion.

Then...

Red giant phase form when the outer core starts fusing. Core collapses and gets denser and hotter.

Helium flash occurs deep within the core suddenly in a few minutes as the helium can burn at a much higher temperature and faster. This can last 100 million years.

Then it joins the Asymptotic Giant Branch

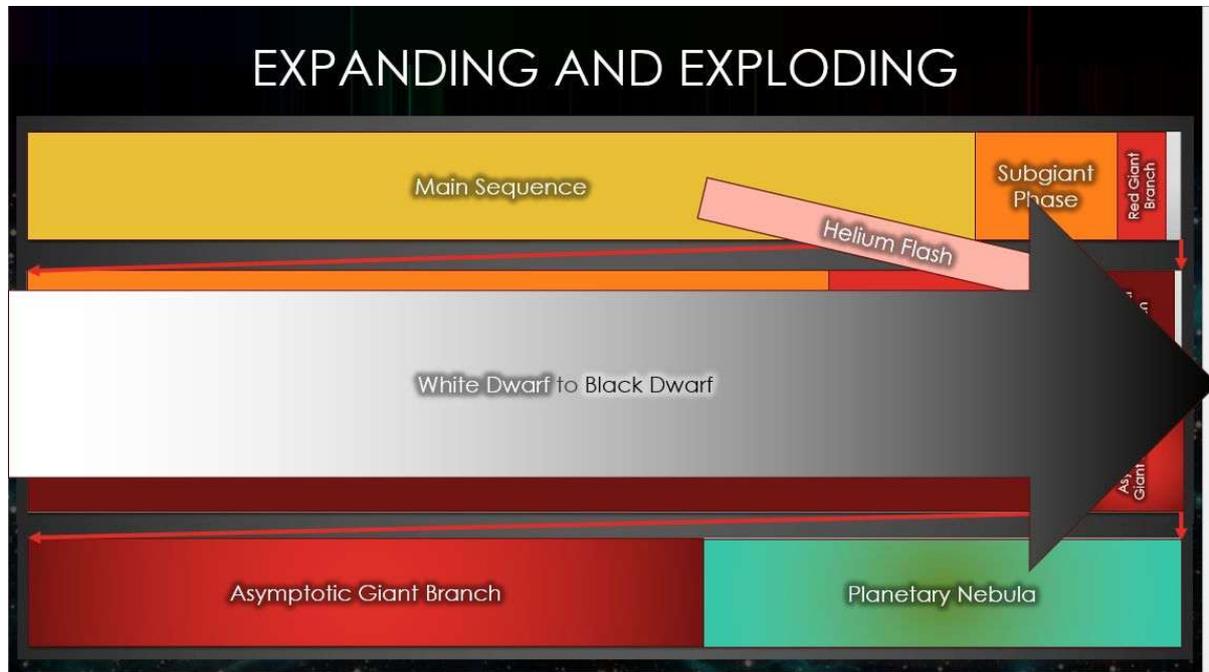
Helium shells flash and convect elements up to surface and it varies in brightness. For perhaps 20 million years..

The outer layers are expelled due to the pulsations and radiation pressure. And there's no new fusion. So the cores collapse to a white dwarf. Their radiation pushes out the gases.

(Shows Sirius A and B 'the pup')

The pup is tiny. And is supported by electron degenerate pressure. They have rules saying they can't be next to each other. Eventually this would theoretically cool to become a black dwarf. The universe isn't old enough for these to have formed yet.

Nice pictorial sequence with arrows! Each step is vastly shorter than the last except the cooling. There was much more detail in the slides.



Some nice examples to observe are:

Herschel didn't discover the Helix nebula in Aquarius NGC 7293 as it's very low and very diffuse – not such a 'nice' example, but a great challenge.

The Dumbbell nebula M27 is lovely and high and bright. – Vulpecula summer-autumn.

The Skull nebula NGC 246. Looks like a skull and is in cetus. (autumn)

The Saturn nebula is a weird shape NGC 7009. This is hard to explain. Sometimes magnetism is involved or spin or a companion. Giving it an axis. (autumn)

We see the Cat's eye NGC6543 with its twisting braids (most of the year)

The Fetus nebula NGC 7008 in Cygnus (summer autumn and winter)

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

Blue snowball nebula Andromeda NGC 7662. (autumn and winter)

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

The Little Dumbbell M76

The little ring nebula. In Aquila.

If we go further out - for a challenge try Pease 1 in globular cluster M15. (Dan's seen it)

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 wavelengths that our eye is sensitive to. 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.

The talk finished quite early and so was followed by many questions about these being seen in other galaxies, what was in William Huggins first spectrum, and if we ever saw them first forming.

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, a very astronomical lady, is joining us in our first attempt at using Zoom for a talk in the Rec Centre Hall in February. She can't travel so far, and we really wanted to hear from her. She is talking about all the famous lady astronomers we have had and their contributions to the understanding of the universe. Many of these have been much cleverer than their male contemporaries due to the difficulties in circumstance they had to face getting into astronomy as a career. Mary is also an excellent moon sketcher and populariser, having now written a book on stargazing.

Coming up

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@](mailto:chairman@brecklandastro.org.uk) or [treasurer@](mailto:treasurer@brecklandastro.org.uk) or visitors@brecklandastro.org.uk. Clear Skies! Feedback is really welcomed as we want to know what you want to know!

Dan Self

John's News Notes for January 2026

SPACE X PULLED OFF A DOUBLE LAUNCH WHEN IT LAUNCHED TWO ROCKETS LESS THAN 4 HOURS APART ON FRIDAY, 14TH NOVEMBER A FALCON 9 ROCKET TOOK 29 STARLINK FROM PAD 39A. THEN ON SATURDAY 15 NOVEMBER ANOTHER FALCON 9 TOOK ANOTHER 24 STARLINK INTO ORBIT.

ON 13TH NOVEMBER BLUE ORIGIN SENT UP 2 MARS BOUND SPACECRAFT ON A NEW GLENN ROCKET FROM LAUNCH COMPLEX 36.

CHINA HAS FINISHED BUILDING ITS OWN SPACE STATION USING ITS OWN ROCKETS, ASTRONAUTS AND CALLED IT 'HEAVENLY PALACE'.

IN DECEMBER ROCKET LAB LAUNCHED A NEW TYPE OF SATELLITE FOR THE US SPACE FORCE FOR THE US MILITARY.

JARED ISAACMAN HAS BEEN CONFIRMED AS NEW NASA CHIEF. HE WAS APPROVED BY THE US SENATE.

MAVEN WENT SILENT AFTER TAKING IMAGES OF 3I/ ATLAS.

PRESIDENT TRUMP HAS SIGNED AN EXECUTIVE ORDER ON 18 DECEMBER THAT COMMITS US TO LANDING ASTRONAUTS ON THE MOON BY 2028 AND PUTTING GROUNDWORK FOR PERMANENT MOON BASE BY 2030 AND LAYING FOUNDATIONS FOR FUTURE MARS MISSIONS.

ALSO CHINA HAS MADE NO SECRET THAT IT WANTS TO START PLANNING A CREWED MISSION TO THE MOON.

AN ARIANE 6 ROCKET HAS LAUNCHED AN EU GALILEO SATELLITE INTO ORBIT.

ARTEMIS 2 SPACE LAUNCH SYSTEM NOW PLANNED FOR A FEBRUARY START.

A FALCON 9 ROCKET TAKE A FOUR PERSON CREW ON FEBRUARY 15TH TO THE SPACE STATION, CREW 12.

A PROTON M ROCKET FROM ROSCOSMOS FROM KAZAKHSTAN WILL LAUNCH A WEATHER SATELLITE INTO GEOSTATIONARY EARTH ORBIT.

AN ATLAS V ROCKET LAUNCHED 27 SATELLITES FOR AMAZON.

CLEAR SKIES FOR 2026!

John Copsey

What was the Christmas Star?

The Star of Bethlehem – nowadays often just called the Christmas Star – is a major seasonal symbol throughout the world.

What was the Star of Bethlehem? Over the years many astronomical explanations have been suggested for this key aspect of the Christmas story.

Imagine, if you will, the silhouettes of three regally attired men on camels. They are gazing across gently rolling hills or dunes of white, to a tiny solitary building in the distance. The night is dark, and one exceedingly bright star appears to hover over the small building, sending a bright shaft of light earthward to illuminate its outline. Another light glows gently inside.



This is the picture most of us have of the Christmas Star, but it's an image derived more from imagination and greeting cards rather than from the Bible. In fact, the Gospel of Matthew in the New Testament is the only place this "star" is mentioned, (Matt 2:2, 7-10, King James Version). Even there, information on the star is sparse. The most telling reference is Matt. 2:9:

"When they had heard the king, they departed; and, lo, the star, which they saw in the east, went before them, till it came and stood over where the young child was."

If this verse is literally true, then the Star of Bethlehem could not have been any known natural phenomenon, simply because none would move that way.

However, if we grant the author of Matthew – who was not an eyewitness at the Nativity – a little artistic license, the "star" might not have appeared literally in the way described. In that case we can consider some natural, astronomical possibilities. In fact, there is some uncertainty about the

use of the word for star in the Greek manuscript. Some contend that the word could have meant or implied an object other than a physical star.

There is no mention of there being three kings, only 'Magi' (wise men, magicians or possibly astrologers) who left three gifts, "gold, frankincense, and myrrh." The Greek word, generally translated as 'star' (αστερα - astera/astra from which we get 'astronomy') can also mean planet, or could refer to other objects such as a comet. Because they were possibly astrologers (not astronomers) they were used to looking for differences in the sky and would have plotted the results on a chart. This may explain the direction "east" otherwise they would have needed to be coming from the west of Bethlehem, not from the Middle East as they were. Although Magi (Greek μαγοι) is usually translated as "wise men", in this context it probably means 'astronomer/astrologer'. The involvement of astrologers in the story of the birth of Jesus was problematic for the early Church, because they condemned astrology as demonic.

There is no mention that the star is particularly bright, and it doesn't appear to have had significance for anyone other than the Magi.

The first consideration is the actual date of Christmas. Here there are problems. Firstly we don't know for sure when Jesus was born. Due to an error by a Church cleric hundreds of years later, the birth of Jesus was thought to be at least four years earlier than it appears. So today we know that the birth was no later than 4 B.C., and it could have been a little earlier. And it certainly was not on December 25. The Bible does not say, leaving us few clues. One clue we do have, however, is the reference that shepherds were out in the field "keeping watch over their flock by night". This is something that at that time was likely only done in the spring when lambs were born.

If the story of the Star of Bethlehem described an actual event, it might identify the year Jesus was born. The Gospel of Matthew describes the birth of Jesus as taking place when Herod was king. According to Josephus, Herod died after a lunar eclipse and before a Passover Feast. The eclipse is usually identified as the eclipse of March 13, 4 BC. (Josephus ben Matthias, the best known ancient Jewish historian, was born in 37 AD, only a few years after Jesus' execution. Josephus was well educated in biblical law and history. On his mother's side he was a descendent of the Hasmonean Kings.

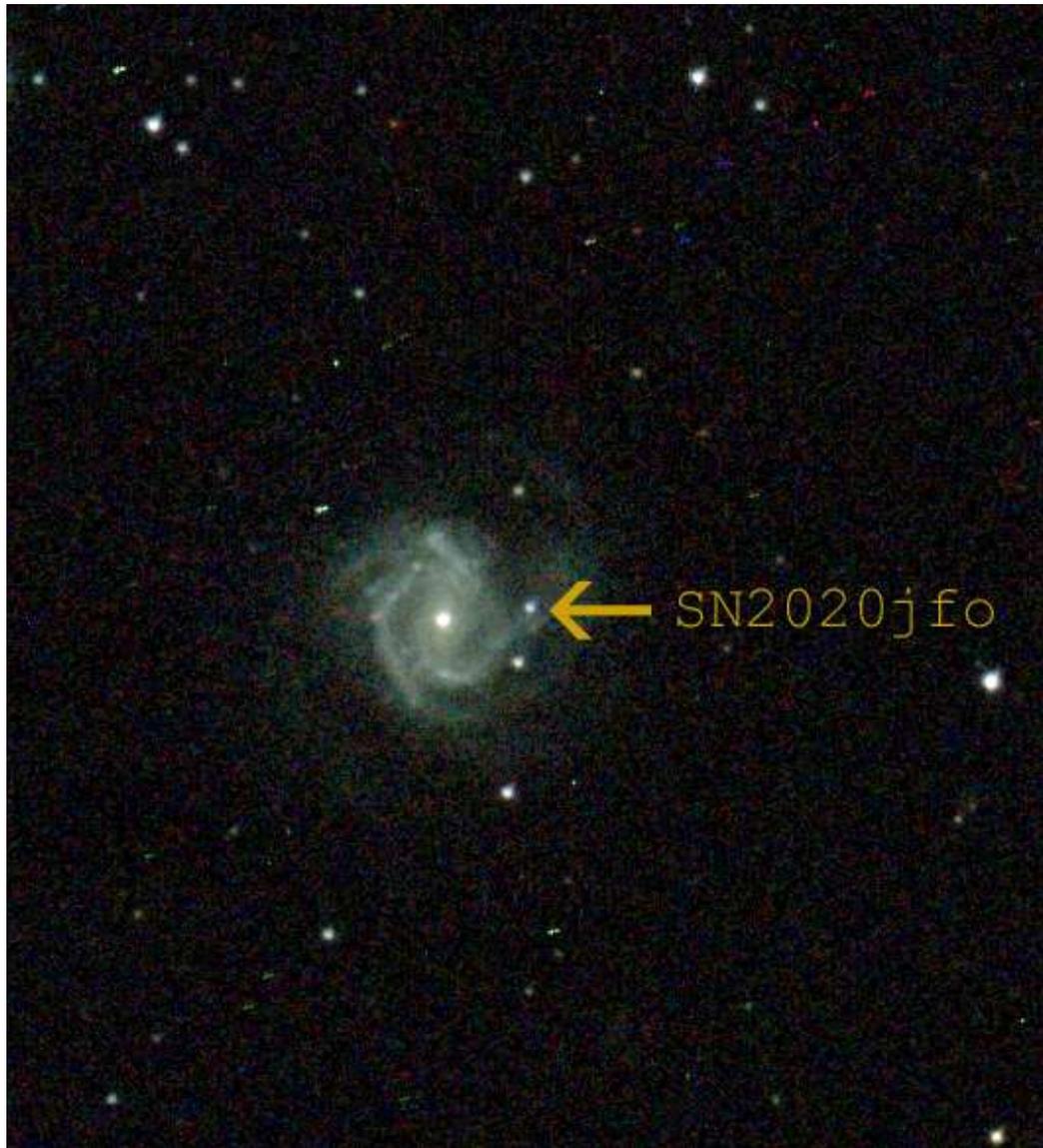
Thus the birth was likely in the spring, probably between 7 and 4 B.C.

Explanation 1: The Christmas Star was a nova or supernova explosion

One possibility is that the Christmas Star was a nova or supernova, a previously unseen star that suddenly brightens in a big way. Indeed, one such star was recorded by the Chinese in the spring of 5 B.C, and was seen for more than two months. However, its position in the constellation Capricornus meant that it is unlikely to have led the wise men in the manner implied in the Bible.

A recent (2005) hypothesis advanced by Frank Tipler is that the Star of Bethlehem was a supernova or hypernova occurring in the nearby Andromeda Galaxy. Although it is difficult to detect a supernova remnant in another galaxy, or obtain an accurate date of when it occurred, supernova remnants have been detected in Andromeda.

Another, more likely, theory is the supernova of February 23 4 BC, which is now known as PSR 1913+16 or the Hulse-Taylor Pulsar. It is said to have appeared in the constellation of Aquila, near the intersection of the winter colour and the equator of date. The nova was recorded in China, Korea, and Palestine.



Explanation 2: The Christmas Star was a comet

Few astronomical records were kept at the time, except by the Chinese and Koreans. They did record what might have been a comet in 5 BC. This object was observed for over seventy days, possibly with no movement recorded. Ancient writers described comets as "hanging over" specific cities, just as the Star of Bethlehem was said to have "stood over" the "place" where Jesus was (the town of Bethlehem).

However, this same argument could be applied to an object moving with the stars if the journey of the Magi took some months. Most classical depictions of the nativity show the 'star' as a comet.

Halley's Comet was visible in 12 BC and another object, possibly a comet or nova, was seen by Chinese and Korean stargazers in about 4 BC.

The main problem here is that comets were generally regarded as omens of evil and bad fortune by the Chinese and likely also by the Magi-astrologers. Rather than follow such a cometary "star," they are more likely to have gone the other way.



Explanation 3: The Christmas Star was a conjunction of Jupiter and Saturn

In 1614, German astronomer Johannes Kepler determined that a series of three conjunctions of the planets Jupiter and Saturn occurred in the year 7 BC. He argued (incorrectly) that a planetary conjunction could create a nova, which he linked to the Star of Bethlehem.

Modern calculations show that there was a gap of nearly a degree (approximately twice a diameter of the moon) between the planets, so these conjunctions were not visually impressive.

An ancient almanac has been found in Babylon which covers the events of this period, but does not indicate that the conjunctions were of any special interest. In the 20th century, Professor Karlis Kaufmanis, an astronomer, argued that this was an astronomical event where Jupiter and Saturn were in a triple conjunction in the constellation Pisces. Archaeologist and assyriologist Simo Parpola has also suggested this explanation. Such an event could have been of religious or astrological significance.



Jupiter, captured with the Society's 9.25" Celestron. Dan Self, Darren Carter and Rod Stevenson, 27 Jun 2018.

In 6 BC, there were conjunctions/occultations (eclipses) of Jupiter by the Moon in Aries. "Jupiter was the regal 'star' that conferred kingships - a power that was amplified when Jupiter was in close conjunctions with the Moon. The second occultation on April 17 coincided precisely when Jupiter was 'in the east', a condition mentioned twice in the biblical account about the Star of Bethlehem."

In 3–2 BC, there was a series of seven conjunctions, including three between Jupiter and Regulus and a strikingly close conjunction between Jupiter and Venus near Regulus on June 17 2 BC. The fusion of two planets would have been a rare and awe-inspiring event

Another Venus–Jupiter conjunction occurred earlier in August, 3 BC. These events however occurred after the generally accepted date of 4 BC for the death of Herod. Since the conjunction would have been seen in the west at sunset it could not have led the Magi south from Jerusalem to Bethlehem.

Explanation 4: The Christmas Star was a stationary point of Jupiter

Jupiter, in its apparent path across the sky, is generally seen to move from east to west across the starry background.

Due to the relative movements of the Earth and the planets, this motion appears to slow and then stop as the planet reaches what is called a 'stationary point'.

The planet then appears to move from east to west for some days before again stopping and resuming its west to east movement. At the possible time of the birth of Christ in the Bible, one of the stationary points could have occurred when Jupiter was directly overhead at Bethlehem at the same time of night for several nights.

The disadvantage of this explanation lies in the lack of any rarity in the phenomenon, as it would happen every year.

Explanation 5: The Christmas Star as a conjunction of Jupiter, Regulus and Venus

One other possibility includes a set of conjunctions of the planets Jupiter and Venus, and the bright star Regulus. In this case, the mythologies associated with the objects become important.

Jupiter in Hebrew is known as 'Sedeq', which is often translated as meaning righteousness. Jupiter is also often viewed as being the 'king' of the planets.

Regulus itself is Latin for 'prince' or 'little king', and Venus is often viewed as a symbol of love, fertility and birth.

As such, the combination of these objects close in the sky could have led to the interpretation of the birth of the 'King of Kings'. Particularly to astrologers who may have been able to predict this combination.

Explanation 5: The Christmas Star as a meteor event

Some artistic depictions show what appear to be a bright meteor or "falling star". Although exploding meteors, sometimes called bolides or fireballs, can be startling and truly impressive, they last only seconds. They can occur at any time. People far more aware of the night sky than the modern city dweller would not have placed much significance in them. Such transient phenomena could not possibly have "led" the wise men to Bethlehem.

Unless some major and indisputable archaeological discovery is found to settle the question once and for all, the mystery of what the Christmas Star was will remain in the realm of faith. Science cannot explain it as any known physical object; history offers no clear record; and religion offers only an untestable miraculous apparition. But although there may be no agreement on the nature of the star or even its actual sighting two millenia ago, all sides can agree on the message the Christmas Star heralded: "... on earth peace, good will toward men." (Luke 2:14).

Understanding the Basics of Cosmology: Dark Matter, Dark Energy, and the Expanding Universe

Astronomers who treat the Universe as a whole are called Cosmologists. There are various large-scale parameters that apply as averages across the entire (at least the visible part of the) Universe.

Cosmology is the scientific study of the origin, structure, evolution, and eventual fate of the universe. With the approach above, it seeks to answer some of the most profound questions humans have ever asked: *How did the universe begin? What is it made of? How is it changing over time?* perhaps even *Why are we here?*

Modern cosmology blends astronomy, physics, and mathematics into a unified picture—one that has become remarkably precise over the last century. Three concepts lie at the heart of today's understanding of the universe: **dark matter**, **dark energy**, and **cosmic expansion**.

However this field of study relies on the “Cosmological Principle”, which states that we can assume that on large enough scales, the Universe is homogenous, not exactly “well mixed” but more like “the same everywhere you look”. You may hear the term, Isotropic, this means something slightly different, that is “looks the same in all directions”.

The Universe Since the Big Bang

The most widely accepted scientific model for the universe's beginning is the **Big Bang theory**. According to this model:

1. The Big Bang (about 13.8 billion years ago)

The universe began as an extremely hot, dense state—a tiny point containing all matter, energy, space, and time. Then, it seems that it expanded rapidly, something called *Cosmic Inflation*. According to this theory, during the first fractions of a second, space itself stretched faster than the speed of light—not a violation of physics, because it was space expanding rather than objects moving through space. This initial burst is inferred from the *Cosmic Microwave Background*, a light visible in all directions as being unusually isotropic, and inflation explains this theory. However, nothing explains why inflation happened! The particles were formed at this phase.

2. Cooling and Structure Formation

As the universe expanded, it cooled. After about 380,000 years it had cooled enough to release its light, that had been trapped in a ‘fog’ of plasma until that point. This light is now seen highly redshifted as the *Cosmic Microwave Background*. Atoms formed, then gas clouds. Under gravity,

these gas clouds collapsed to form the first stars and galaxies. Space continued to expand while these structures condensed.

3. Expansion isn't constant

One of the most surprising discoveries of the 20th century was that the universe is *still* expanding—and not only that, the rate of expansion is increasing. This was discovered by Saul Perlmutter and Brian Schmidt in the late 90s. The accelerating expansion leads to one of the great mysteries of cosmology: dark energy. Or at least they can see something that appears to be this. They used redshifts and brightnesses of Type 1a supernovae. These all should occur at a certain brightness, so can be used as a “standard candle”. The measurement has since been refined with surveys such as the Zwicky Transient Facility.

Why Does the Universe Expand?

Cosmic expansion refers to the growth of space itself. Galaxies aren't flying apart through space; instead:

Space is stretching between them.

A common analogy is raisin bread dough: as the dough rises, the raisins get farther apart, not because they're moving, but because the dough (space) is expanding.

The rate of expansion is described by a number called the **Hubble constant**, H_0 . Its precise value remains a topic of active research, with different measurement techniques yielding slightly different results—a puzzle known as the *Hubble tension*.

What Is Dark Matter?

Dark matter is a form of matter that does not emit, absorb, or reflect light. That makes it invisible—or “dark”—to telescopes. Scientists only detect it indirectly through its gravitational effects, but it is based on very clear observations and more robustly measured, having several different lines of evidence. It was first proposed by Fritz Zwicky and much later, Vera Rubin got much better measurements of it. Matt Bothwell does an excellent job of explaining it in his Royal Institution talk on youtube here: <https://youtu.be/bLa3k0NoHvY?si=ENMRkW-b4a8viVeD>

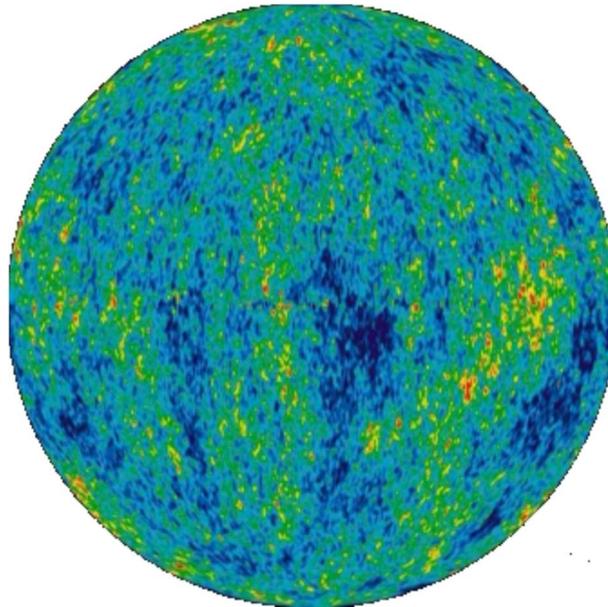
Why do we think dark matter exists?

There are many lines of evidence. Observations of galaxies reveal something unusual:

- Stars in the outer regions of galaxies orbit much faster than they should if only visible matter were present.
- Galaxy clusters contain far more mass than we can see, based on how they bend light (gravitational lensing).

- Observations of dust and gas X-ray emission and gravitational lenses showing where mass is distributed show the dark matter is displaced from the dust and gas, which should correspond with the majority of the classical mass in a galaxy cluster.
- Computer simulations of galaxy formation only match real galaxies if dark matter is included.

Also, the cosmic microwave background radiation has been analysed and requires a substantial excess of dark matter over known matter. See diagram showing extremely subtle temperature fluctuations in the radiation across the entire sky.



What could dark matter be?

No one knows for certain. Possibilities include:

- Weakly interacting massive particles (WIMPs), although particle detectors have seen nothing in the ranges where they are theorised to show up.
- As exotic particles have not yet been detected, attention is turning to Axions.
- Other hypothetical forms of matter
- Something wrong with our models of gravity. Again many theories have been ruled out by observations of the universe, according to many scientists, not all. Some studies claim the opposite, e.g. wide binary pairs, and the 'external field effect'.

What's clear is its importance: **dark matter makes up about 27% of the universe's total energy content**, vastly outweighing normal matter (the atoms that make stars, planets, and people). This number was arrived at based heavily on the Cosmic Microwave Background data and modelling.

What Is Dark Energy?

If dark matter holds the universe together with gravity, **dark energy** does the opposite. It drives the universe's accelerated expansion.

How was dark energy discovered?

In the late 1990s, astronomers studying distant supernovae found that these exploding stars appeared dimmer than expected. The only consistent explanation was that the expansion of the universe is speeding up.

What could dark energy be?

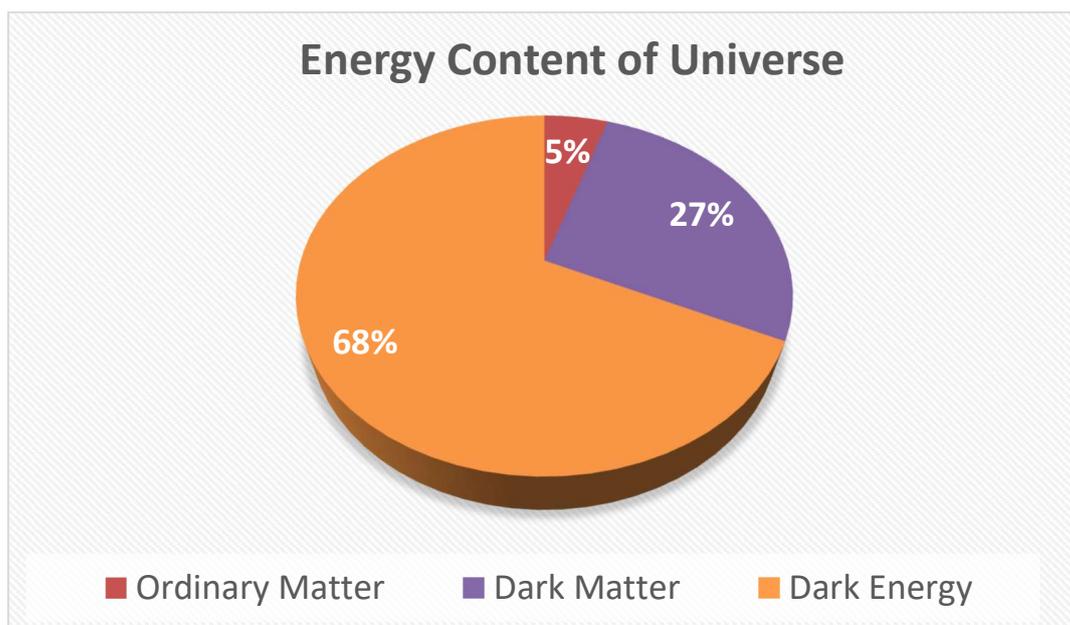
Dark energy is even more mysterious than dark matter. It may represent:

- A property of empty space itself (called the *cosmological constant*)
- A dynamic energy field permeating space
- Something entirely unknown in physics today

Whatever it is, **dark energy makes up about 68% of the universe**—meaning most of the cosmos is something we don't yet understand. Plus it is increasing in proportion as it scales closely with space volume. This leads to the lack of conservation of energy, whereas energy density is conserved instead (energy per unit volume of space). A truly strange concept!

The Universe is Dominated by the Invisible

Putting the cosmic inventory together we can summarise not just the matter but total Energy Content in the following chart:



This means that nearly all of the universe is made of components that don't behave like anything we experience in everyday life. The 5% includes all things we know of, such as radiation, neutrinos, as yet unseen but inferred dust and gas – mostly “baryonic” matter, which means atoms (baryons are the particles inside an atomic nucleus, which comprise the vast majority of their mass).

The Big Picture

Cosmology has transformed philosophical speculation into an accurate, evidence-based science. Yet the field remains full of open questions:

- What is dark matter made of?
- Why is the universe expanding faster?
- What exactly happened before (or during) the Big Bang?
- How will the universe end—slow cooling, a “Big Rip,” or something else?

Understanding these mysteries requires advancements in the theory, technology, and observation. Some of which may take centuries for humans to develop. But one thing is now certain: the cosmos is far more vast and fascinating than the small portion we can see in our observable universe – the small portion from which light and information has reached us.

Dan Self

NASA unveils new images of interstellar Comet 3I/ATLAS



Source: Reuters

Astronomers continue to track the mysterious interstellar visitor [Comet 3I/ATLAS](#) as it speeds through the solar system, using spacecraft and telescopes both in orbit and on Earth

On Wednesday, NASA released its latest images of the interstellar object after the U.S. government shutdown led to a month-long pause in public updates from the space agency.

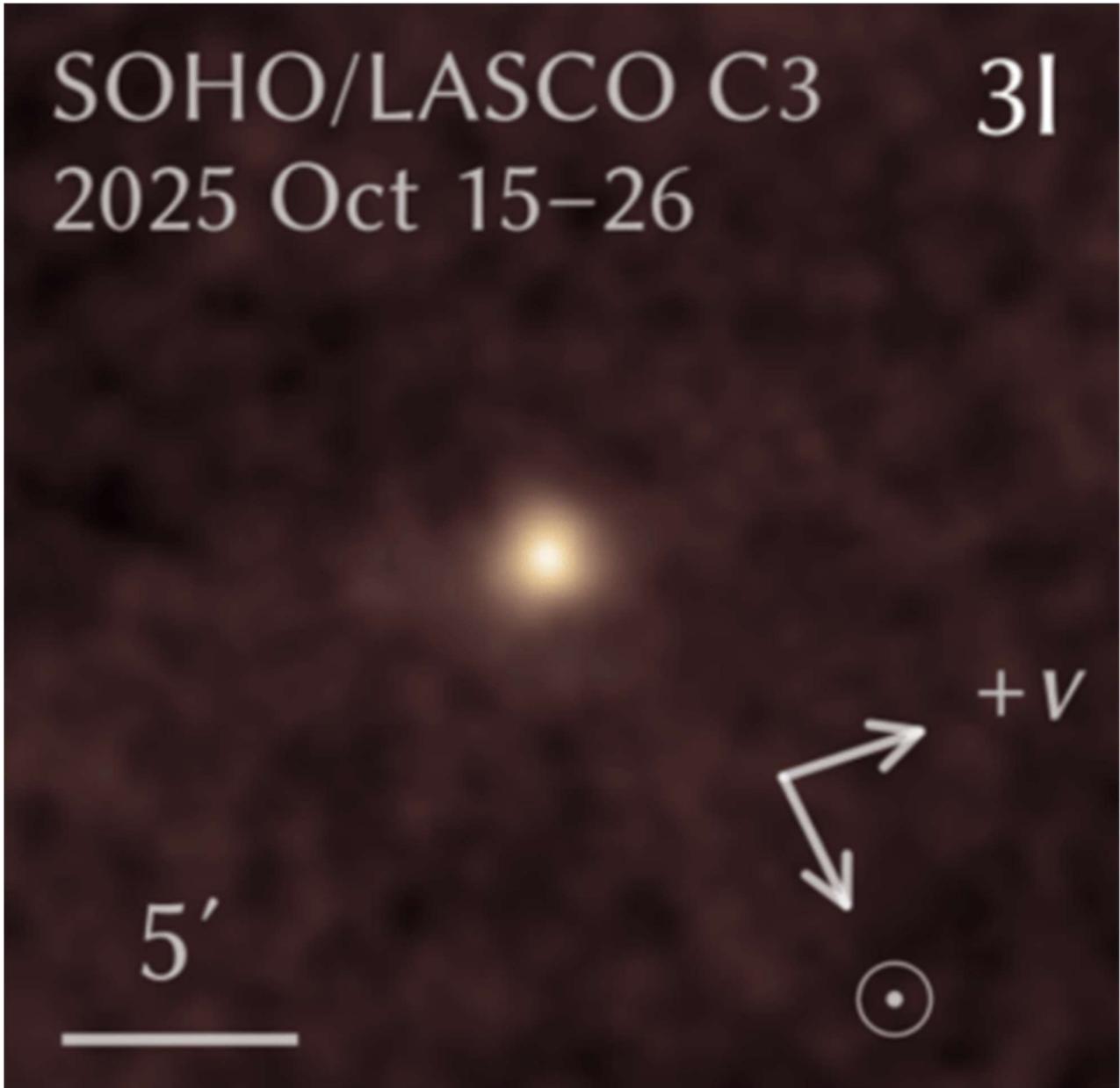
Comet 3I/ATLAS was discovered in July by the Asteroid Terrestrial-impact Last Alert System (ATLAS) observatory in Chile - a NASA-funded project designed to detect potentially hazardous asteroids and comets. It is only the third confirmed interstellar object ever observed entering our solar system, following 1I/'Oumuamua in 2017 and 2I/Borisov in 2019.

During the government shutdown, NASA's communications pause temporarily limited access to new imagery and mission updates. However, other space agencies - including the European Space Agency (ESA) - continued to monitor the comet. In October, ESA released images captured during a Mars flyby using orbiters originally designed to study the Red Planet, not fast-moving interstellar objects millions of miles away.

NASA: Comet 3I/ATLAS not aliens

NASA Associate Administrator Amit Kshatriya addressed growing online speculation about the comet's origins, firmly dismissing rumours that it could be alien technology.

"3I/ATLAS is a comet," Kshatriya said.

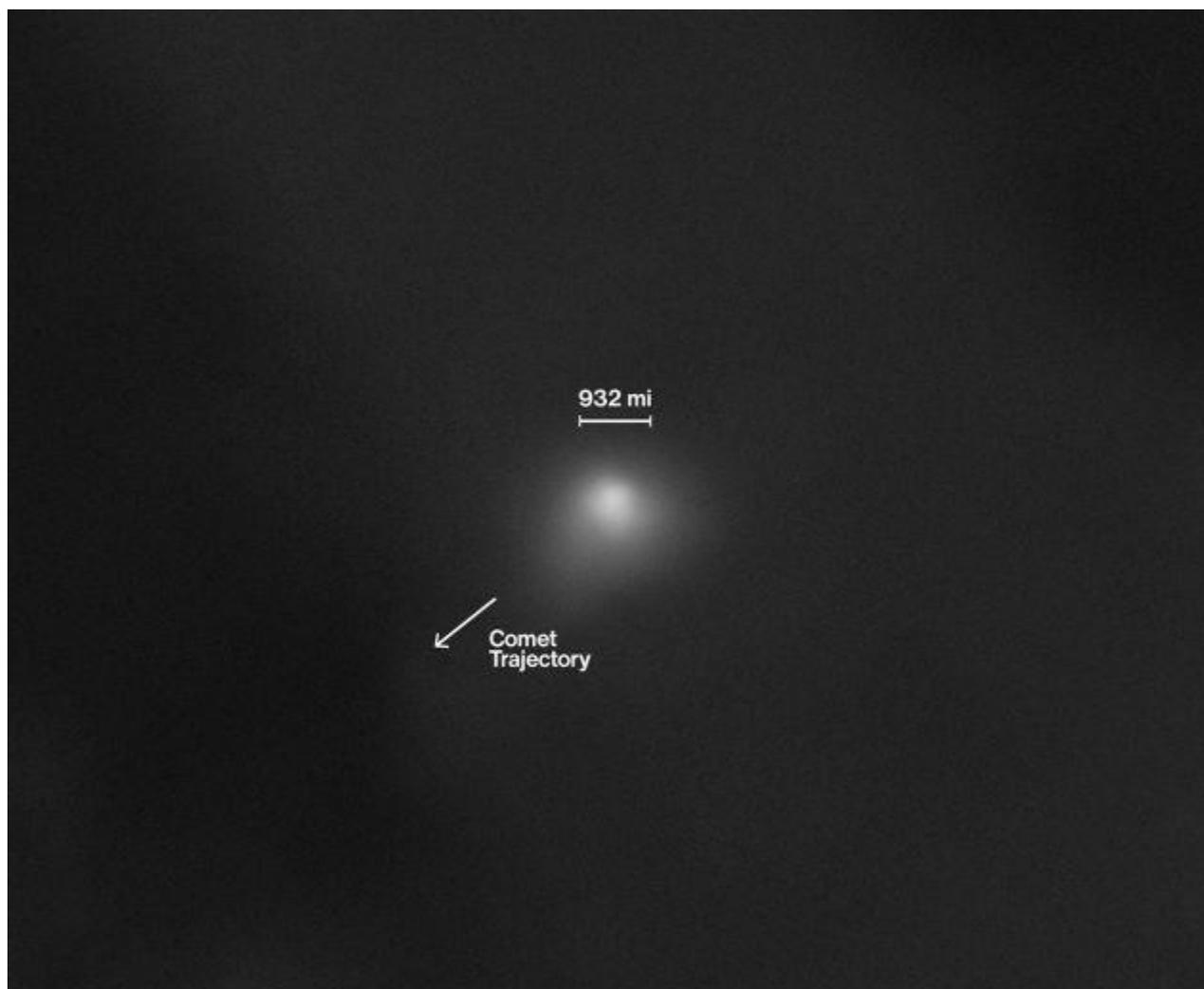


Source: NASA

Nearly a dozen spacecraft and space telescopes are currently observing the interstellar comet as it travels through the solar system. On Wednesday, NASA released new images from the SOHO mission - which studies the sun - as well as from several Mars missions, including the Perseverance rover, Mars Reconnaissance Orbiter (MRO), and MAVEN spacecraft.

Some of the closest images were captured between Oct. 15 and 16 by the joint ESA/NASA SOHO spacecraft, showing a subtle brightening as the comet approached the sun.

Astronomers are particularly interested in how Comet 3I/ATLAS behaves chemically before and after reaching perihelion - its closest point to the sun - which occurred on Oct. 31, when it passed within about 126 million miles (203 million kilometers) of our star.



Source: NASA

According to NASA, Comet 3I/ATLAS made its closest approach to Earth on Dec. 19, remaining roughly 170 million miles (274 million kilometers) from the planet. Researchers hope that the latest data and imagery will help reveal how interstellar comets differ from those native to our solar system - offering rare clues about the formation and composition of distant star systems.

Understanding Eyepiece Specifications

After years of helping fellow astronomers choose eyepieces, I've learned that understanding specifications makes all the difference between a great purchase and a disappointing one. Let me break down these crucial details that determine not just what you'll see, but how comfortable you'll be while observing.

Focal Length and Magnification Calculation

The first thing to look at on any eyepiece is the focal length – that number, normally now in millimetres, stamped on the barrel. Shorter focal lengths give you higher magnification, while longer ones show you more sky.

Here's the simple maths for magnification: $\text{Magnification} = \text{Telescope focal length} \div \text{Eyepiece focal length}$

Example: put a 10mm eyepiece in a telescope with 650mm focal length, and you get 65× magnification ($650 \div 10 = 65$). Replace with a 5mm eyepiece and the magnification changes to 130x. This explains why swapping eyepieces changes your magnification so dramatically.

Exit pupil

One thing you should always check: exit pupil diameter (eyepiece focal length \div telescope f/ratio). If it's over 7mm, you're wasting light – it's just spilling around your eye's pupil. Most human eyes open up to a maximum of 7mm. For example a 40mm eyepiece on a fast F4 Newtonian telescope will give a 10mm exit pupil. Replacing it with a 20mm eyepiece will give a 5mm exit pupil which can all be used by the eye.

Apparent vs. True Field of View

We deal with two different field measurements in eyepieces. The apparent field of view (AFOV) tells you how wide the view looks through the eyepiece alone – anywhere from 40° to 110° depending on the design. Here's what they typically offer:-

Plössl: about 50°

DeLite: 62°

Panoptic: 68°

Delos: 72°

Nagler: 82°

Ethos: 100-110°

But what really matters is the true field of view (TFOV) – the actual chunk of sky you're seeing. You can figure it out by dividing apparent field by magnification:

For a basic idea of True field of view = Apparent field of view ÷ Magnification

So with a 20mm eyepiece on a 500mm telescope as before the magnification is 25 therefore for the

Plössl: about 50° Apparent field of view. True field of view 2°

DeLite: 62° Apparent field of view. True field of view 2.48°

Panoptic: 68° Apparent field of view. True field of view 2.72°

Delos: 72° Apparent field of view. True field of view 2.88°

Nagler: 82° Apparent field of view. True field of view 3.28°

Ethos: 100-110° Apparent field of view. True field of view 4.00°-4.40°

For more precision, try this formula: True field = (Eyepiece field stop diameter ÷ Telescope focal length) × 57.3

The field stop, by the way, is the metal ring inside the eyepiece that physically limits your view. This may not be easily available, and I would not recommend disassembling an eyepiece in an attempt to measure it. The field stop is used to stop edge reflections and increase contrast, but most eyepieces will work to almost the full apparent field of view calculated with the first formula.

It is worth calculating the three factors listed above for each eyepiece that is to be used with a particular telescope so that a good decision can be made of what is most suitable for a given Object/Conditions.

Eye Relief: Critical Factor for Comfort

Eye relief might sound technical, but trust me – it's all about comfort. It's the distance from the top lens to where your eye needs to be for the full view. This really matters if you wear glasses – you'll want at least 15-20mm of eye relief.

I've found that eye relief usually shrinks with focal length, which can make high-power viewing a real pain. If you've got astigmatism and wear glasses (telescopes can't fix that), good eye relief becomes crucial.

Here's something interesting I discovered: with tiny exit pupils (1mm or less), you might not even need your glasses. Those pencil-thin light beams actually bypass most eye defects.

The practical problem with short eye relief? Your eyelashes keep hitting the lens, smearing oils that eventually damage the coatings. That's why I'm glad manufacturers now design high-power eyepieces with more eye relief than their design would naturally give.

Optical Performance Characteristics

After testing eyepieces, I've learned that specs on paper don't always tell the whole story. The real test comes when you point that eyepiece at the night sky

Edge Sharpness and Field Flatness

You know what really separates great eyepieces from merely good ones? The stars at the edge of the field. I learned this lesson the hard way – spent years thinking my cheaper eyepieces were just fine until someone let me look through their premium glass. The difference at the field edge was shocking.

Field flatness is something I wish someone had explained to me earlier. Picture the focal plane like a sheet of paper – cheap eyepieces tend to curve it like a bowl. Here's a simple test I use: centre a medium-bright star, focus it perfectly, then slide it to the edge. If you need to refocus to sharpen it up, you're seeing field curvature. I can't tell you how many times I blamed my telescope's collimation before figuring this out!

The premium eyepieces I use now keep everything sharp across the whole field. Makes such a difference when you're trying to study large star clusters or extended nebulae.

Contrast and Light Transmission

Here's something that took me years to really understand – contrast matters more than almost anything else. It's not just about brightness; it's about how well the eyepiece handles scattered light, coating quality, surface accuracy, and transmission efficiency. Good contrast lets you spot details on Jupiter that you'd miss otherwise or see those faint outer regions of galaxies.

The best eyepieces I've used control light scatter through:

Super-smooth lens polish

Top-notch anti-reflection coatings

Blackened edges that trap stray light

Precisely machined internal parts

One thing that surprised me – simpler designs often give better contrast naturally. Those fancy multi-element eyepieces need really precise manufacturing and sophisticated coatings just to match the contrast of simpler ones. Sometimes less really is more!

Chromatic Aberration Control

Let me tell you about the rainbow effect that drove me crazy when I first started observing – chromatic aberration. Even my expensive eyepieces show some colour fringing at the edges. Took me a while to accept that this is just physics – different colours of light focus at slightly different points.

There are actually two types; longitudinal chromatic aberration, where colours focus at different distances, and lateral chromatic aberration, where they focus at different heights off axis. The premium eyepieces handle both pretty well through clever designs and exotic glass.

Practical Considerations for Selecting Eyepiece Types

Matching Eyepieces to Telescope Types

Telescopes with focal ratios below $f/5$ can be really picky about eyepieces. What looks great in an $f/10$ scope can show awful edge distortion in a fast telescope. Through trial and error, I've found that premium eyepieces from Tele Vue, Pentax, and Baader handle these fast scopes best.

Schmidt-Cassegrains at $f/10$ are much more forgiving. I've had excellent views through these telescopes even with mid-range eyepieces. Dobsonians are trickier – their typically faster focal ratios really benefit from better quality eyepieces, especially for wide-field views.

Building a Versatile Eyepiece Collection

Here's something I wish someone had told me when starting out – buy three really good eyepieces instead of six mediocre ones. A solid starter set needs:

Low power eyepiece: I use this constantly for finding objects and framing large deep-sky targets

Medium power eyepiece: Perfect for most galaxies and nebulae

High power eyepiece: Essential for those steady nights when planets and lunar details pop

For calculating focal lengths, I follow two simple rules: for lowest power, choose an eyepiece that gives about a 5mm exit pupil (matching your dark-adapted eye). For highest power, stick to 60x per inch of aperture.

Budget vs. Premium Options: Where to Invest

I've watched countless beginners chase maximum magnification, only to discover that low-power eyepieces matter more for real astronomy. From experience, I suggest budgeting about half your telescope's cost for eyepieces as a start.

If you're working with under £50 each, don't despair, the Svbony 68 degree UW eyepieces are a surprising improvement over the eyepieces that come with most beginner telescopes even though they are a Kellner design. For under £100 – Celestron X-Cel LX eyepieces offer very good views and are my go-to eyepieces for solar work or star parties. Between £100-£250, you'll find Baader Planetarium's Hyperion line hard to beat in performance and flexibility as all but the 31mm and 36mm fit both 1.25" and 2" focusers without an adapter. Above £250, premium options like TeleVue Naglers show what's really possible with perfect edge correction and outstanding contrast.

Unlike telescopes that you might outgrow, quality eyepieces last forever. I still use premium eyepieces I bought years ago. Your observing interests should guide your investments – wide-field observers need excellent low-power eyepieces, while planetary viewers might want top-notch short focal lengths.

What about zoom eyepieces?

Zoom eyepieces have their place. In the early days of zoom eyepieces they gained a poor reputation due to compromises in their design. Modern premium zoom eyepieces are much better and can be used. They have the advantage that you can use the low power (longer focal length end for centring and then raise the magnification for looking at detail. I must admit it confirmed what I already knew that overdoing the magnification is a false goal in most cases. They are very useful for outreach where you can frame an object easily.

Conclusion

Looking back at my journey through eyepiece evolution, I'm amazed at how far we've come from those simple glass elements of early telescopes. Every time I think we've reached the limit of what's possible, someone proves me wrong with another innovation.

The military connection still fascinates me – who would have thought that tank gunners would give us the wide-field views we enjoy today? Those Erfle and König designs changed everything. Then Al Nagler came along and showed us what was really possible. The first time I looked through a 100-degree eyepiece, I actually pulled back from the telescope because the view was so immersive!

The technology keeps advancing – every year brings new glass types, better coatings, wider fields. Sometimes I wonder what Galileo would think of our modern eyepieces! But those basic principles we've covered – focal length, eye relief, field of view – they're still the foundation of everything.

Remember what I said at the beginning – your eyepiece is the critical link between telescope and eye. It doesn't matter how big your mirror is or how perfect your tracking – a poor eyepiece will waste it all. Take your time, do your research, and choose eyepieces that match your needs. I've seen humble telescopes deliver stunning views through quality eyepieces, while expensive scopes disappoint through poor ones. In the end, the right eyepiece doesn't just show you the universe – it brings you closer to it.

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



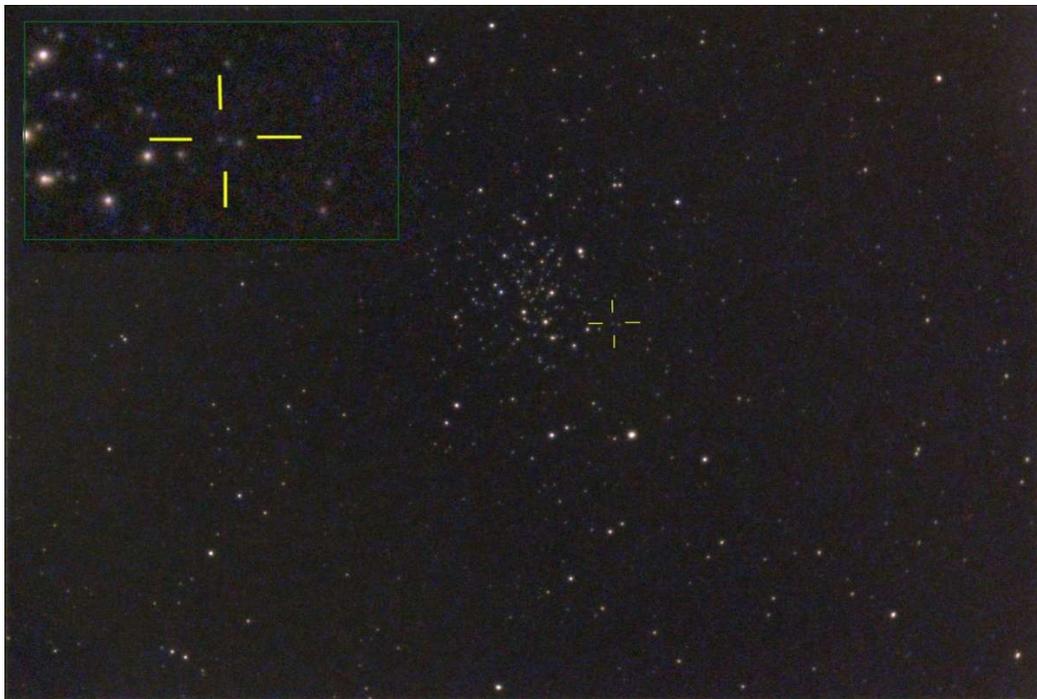
Quick 7 shots of Bodes Galaxy M81



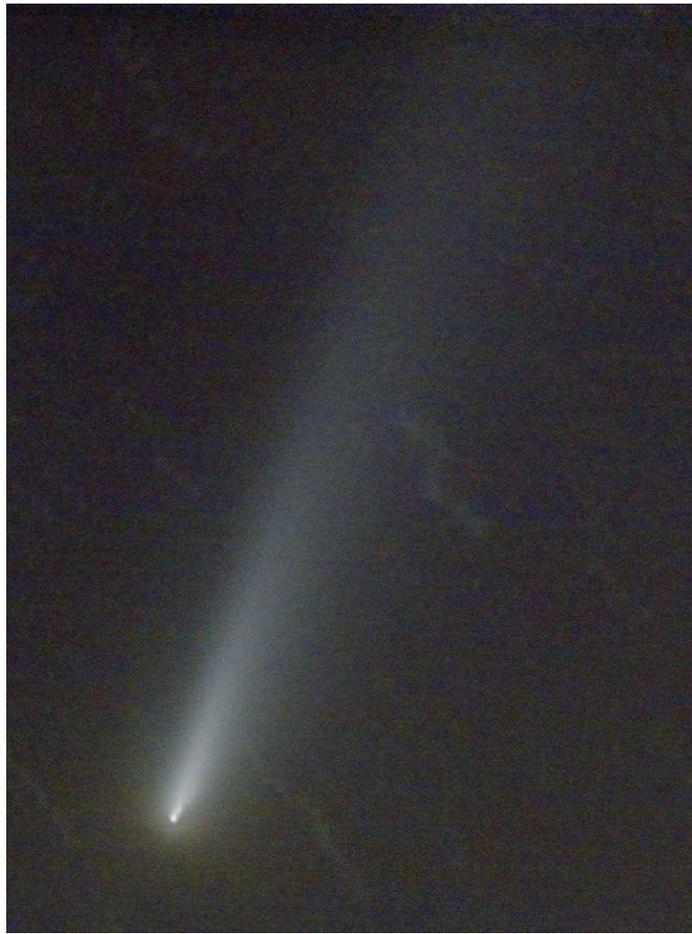
Quasar 11 million Light Years in Andromeda 24 X 15 sec



NGC891 11X30sec Star reducing processing by Google Gemini



Jupiter's 6th Moon Himalia Meets cluster NGC2420



Comet K1 Atlas 24X30sec morning 24th November



Unknown Nebula in Orion's arm 8X30sec De-noised by Richard Harmon

Mick Ladner



The Pleiades M45 Dwarf 3 smart telescope 326 x 30 sec subs @ 60
Processed using Stella Studio. Very pleased with the result.

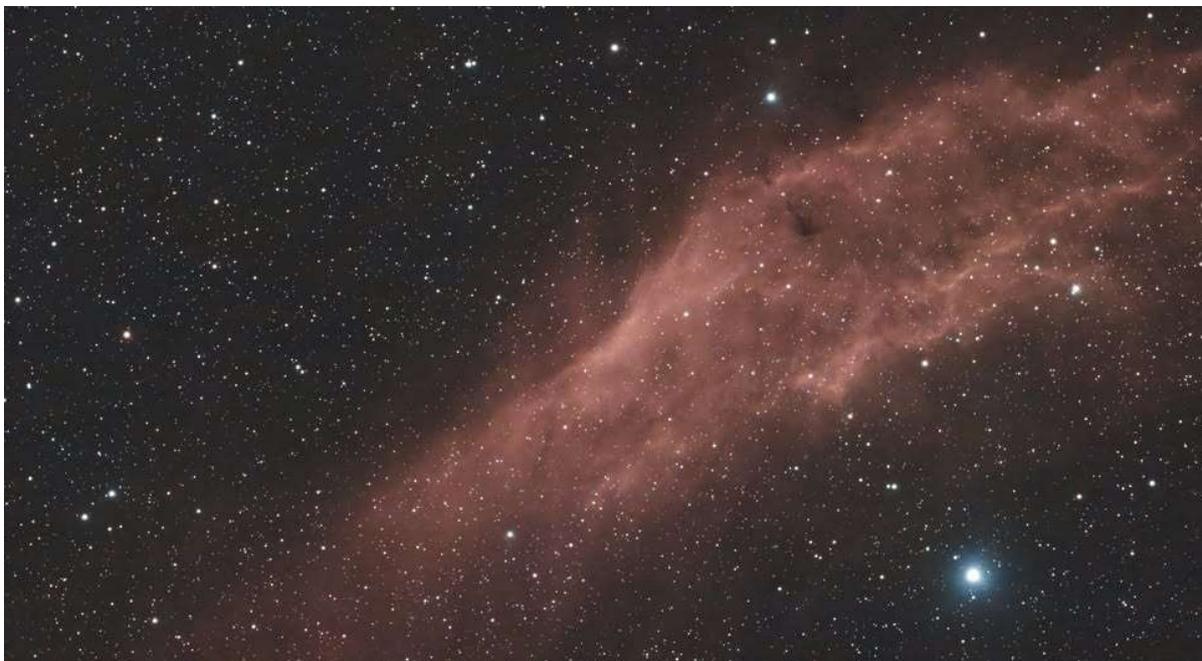


Heart Nebula. Dwarf 3 519 sub frames of 30 secs @ 60 gain plus calibration frames Duo Band filter selected. Stacked and processed using PI with a small final adjustment in LR.



Processed from Telescope Live (TL) IC 5146 the Cocoon Nebula. The LRGB dataset has a total exposure time of 3hrs 20mins, the telescope is based in Italy.

I have processed this using PI with a small enhancement in LR

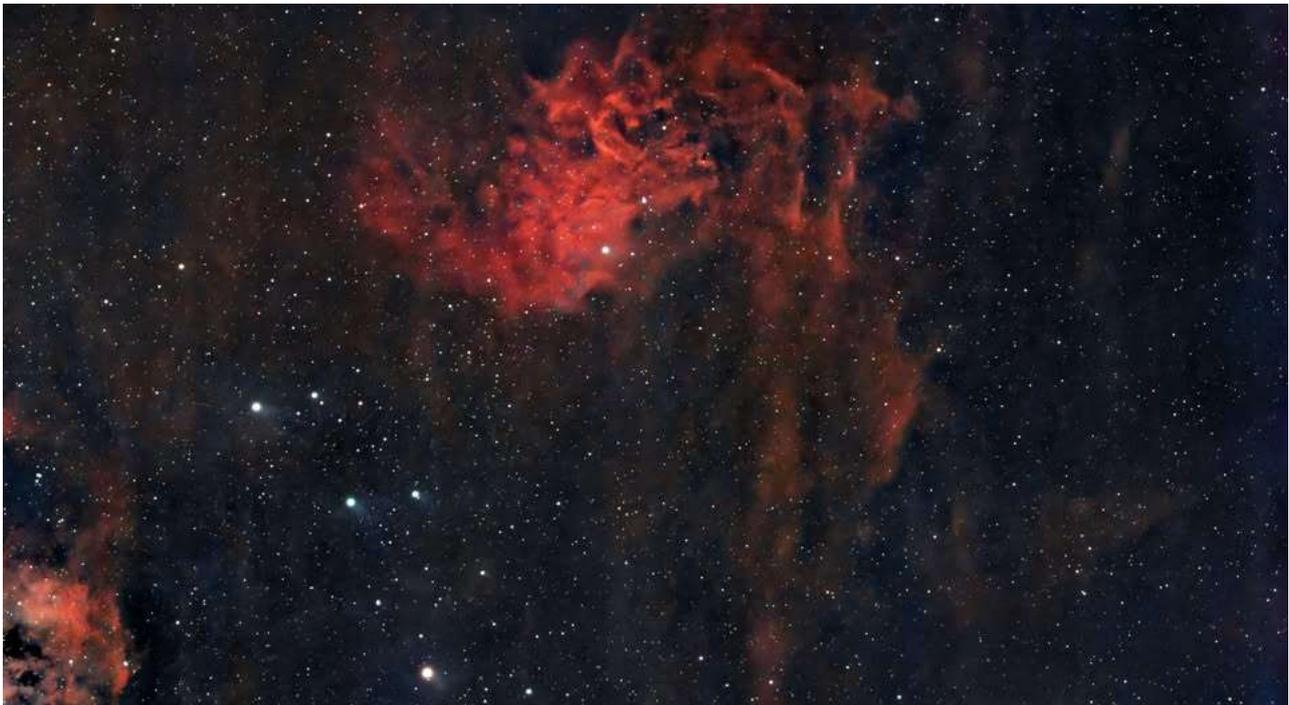


Californian Nebula NGC 1499. Dwarf 3 400 frames of 30 secs @ 60 gain Dual Band filter using the in camera Stellar Studio.



Telescope Live (TL) NGC 5078 a spiral galaxy in Hydra constellation, Processed from an LRGB dataset using PI and LR. Total exposure time 2hrs 35mins from a telescope in Chile.



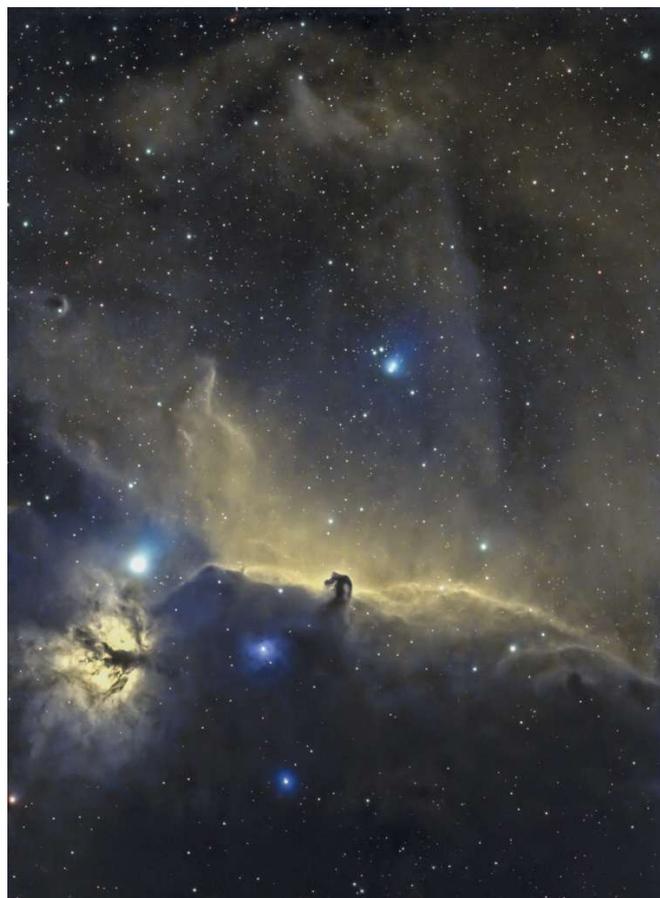


Flaming Star Nebula IC 405 Dwarf 3 Smart Telescope. 400 x 30 sec subs @ 60 gain with the Duo Filter in EQ mode. Processed using PI

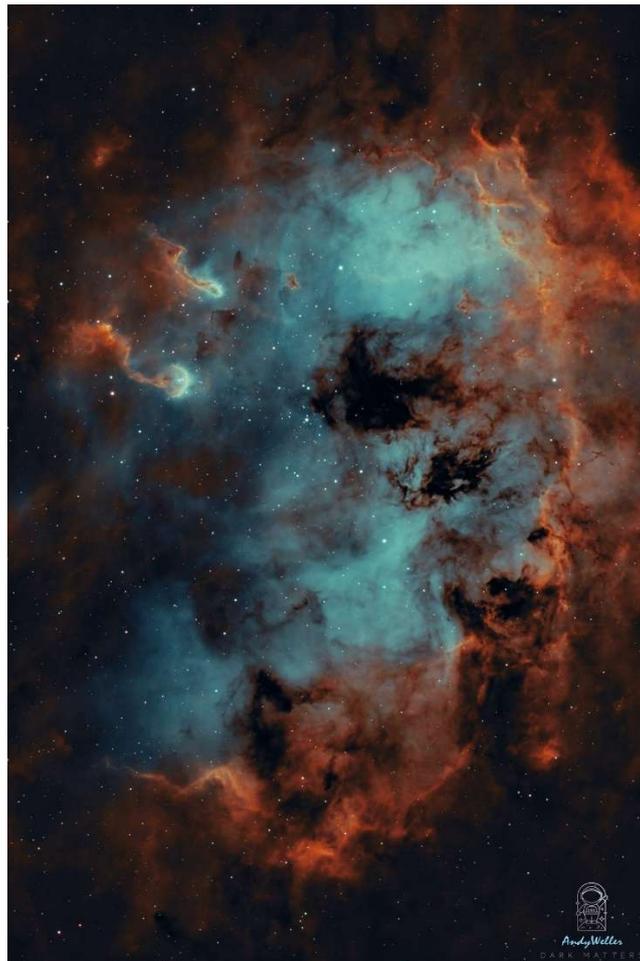


Orion Nebula Dwarf 3 Smart scope. 151 subs x 30 seconds @ 60 gain

Duo Band filter EQ mode. Processed using PixInsight.



Andy Weller



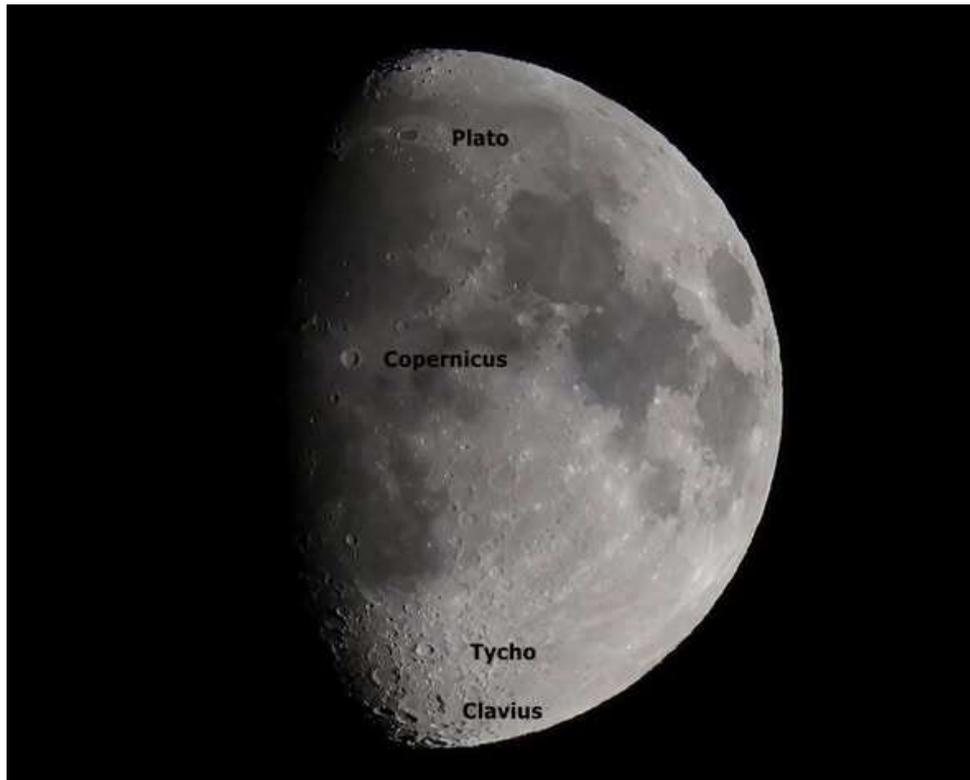
IC40 The Tadpoles Edge 11 HD ZWO asi2600MC Pro with a Optolong L_Ultimate.



Flaming Star nebula/IC40 WO GT81 IV and SHO filters



David Bryant



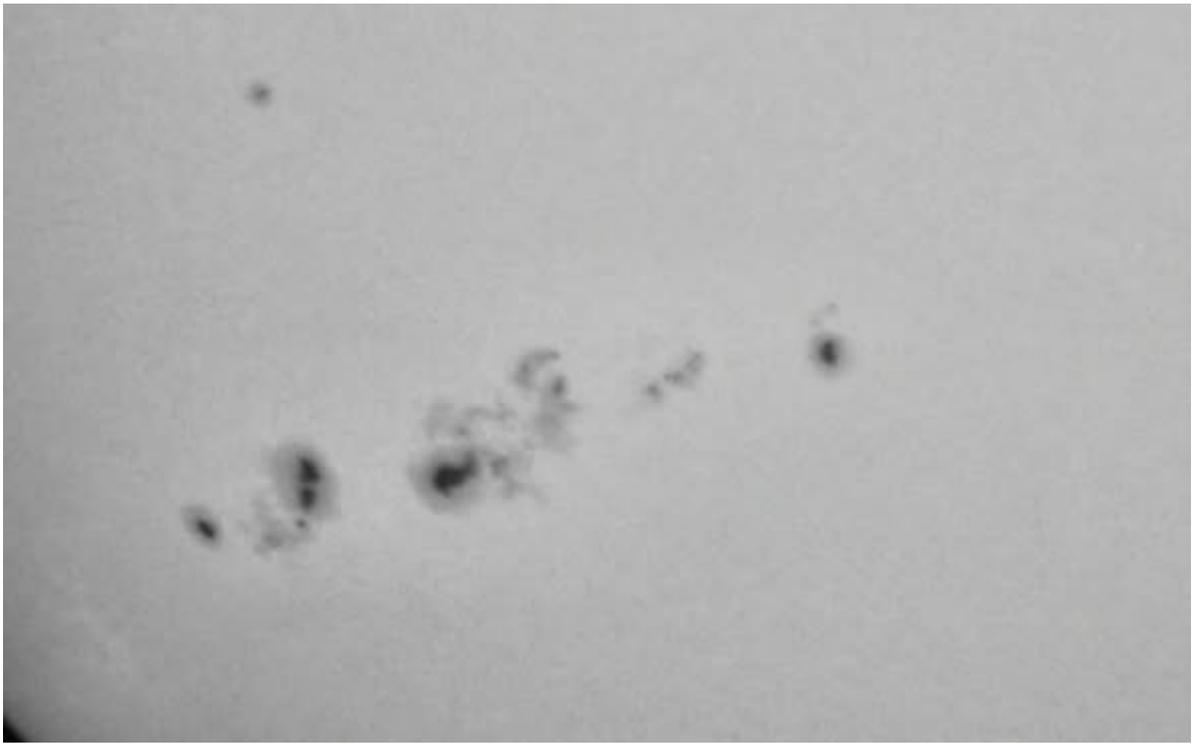


Beaver' Moon











Moon and Jupiter.

Dave Andrews



Seestar S50.



Supermoon taken on seestar S50



Hayley Janet

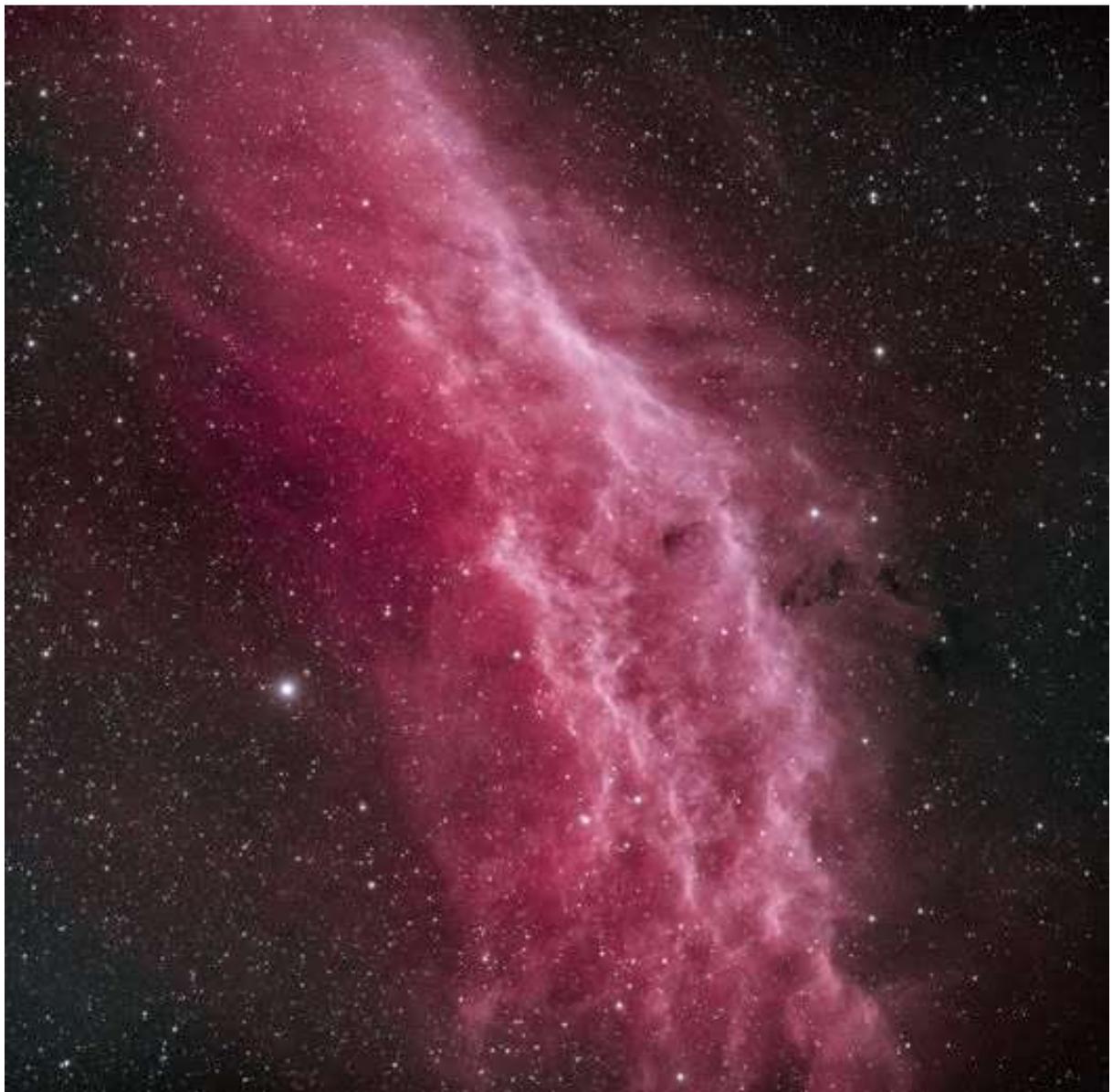


Roger Hyman



Comet C/2025 A6 Lemmon. William Optics GT7 x0.8 reducer Player One Saturn C.



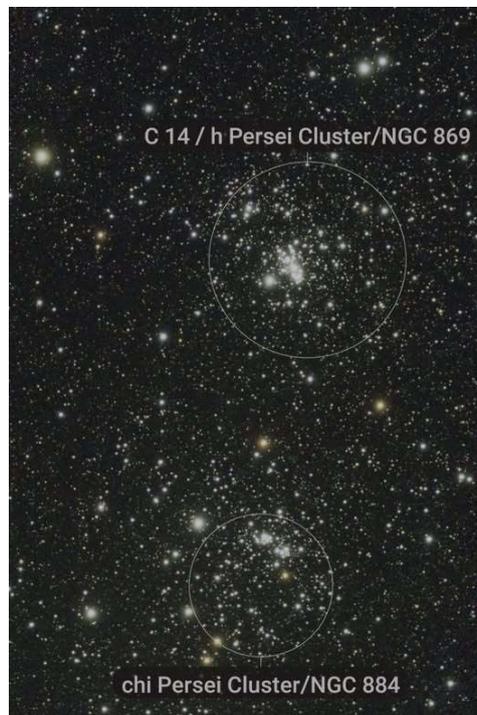


California Nebula RedCat 51. 3 ½ hours in SII and 6 hours in Ha. Made a false OIII with SII and Ha. Processed in Astro Pixel Processor and Photoshop.

Pat Goddard



ZWO Seestar S50.



Double Cluster in Perseus. 60mins x 10sec exposures Stacked in ZWO Seestar S50 software.



ZWO Seestar S50 Stacked with internal software.



Seestar S50 隳

M 42

#AstroNfk/00°E,52°N/2025-12-22 20:23

22min

Frank Dutton



20251117 NGC7023 Iris Nebula
Reflection nebula 1,300 LY away 6 LY across
Frank Dutton FRAS



20251117-NGC891
Edge on barred spiral galaxy
1.8 M LY away
Frank Dutton FRAS



20251120 M51a Whirlpool Galaxy
25 M LY away 76,900 LY across
Frank Dutton FRAS



C/2025 K1 (ATLAS) | exposed 90 secs (9x10s)
Thu Nov 20, 2025 04:35 / King's Lynn, England





20251122 M33 Triangulum Galaxy
3 million LY away 61,100 diameter
Frank Dutton FRAS

Seestar 50 processed in-Siril & Affinity 360x10sec subs



Markarian's Chain | exposed 4130 secs (413x10s)
Wed Nov 26, 2025 04:21 / King's Lynn, England

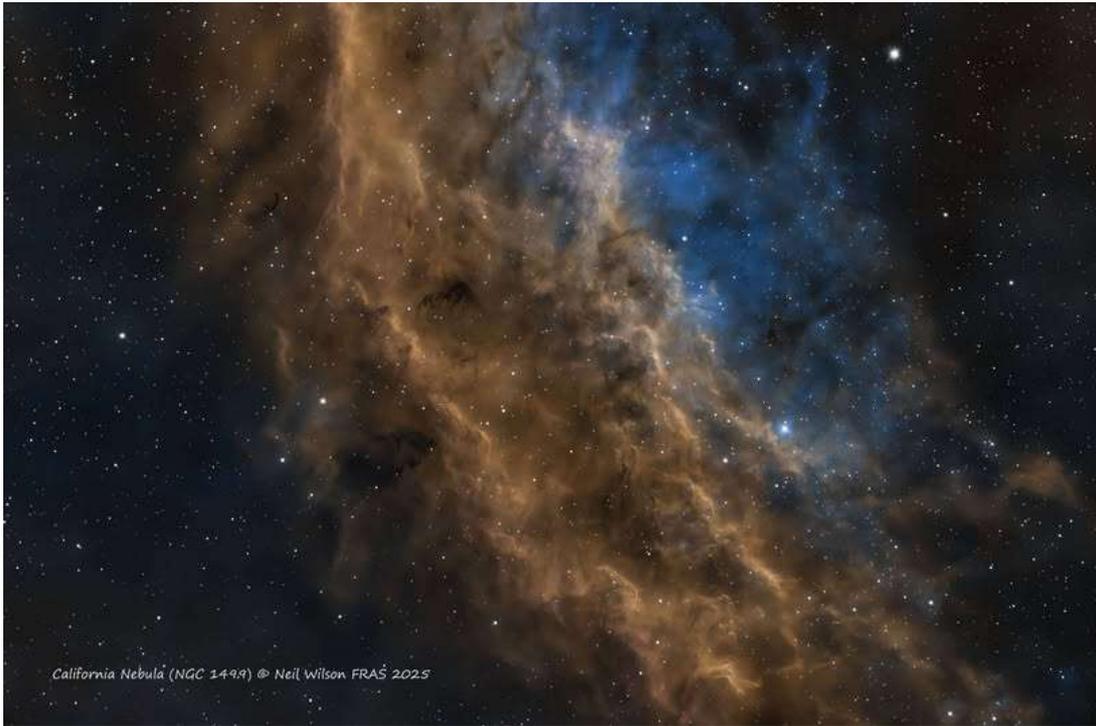




Rosette and surrounding area.

Whitecat 51 F4.9 on the AM5 mount. Used the ASI2600MC Air camera with an Altair Astro OiiHa filter. 18x3min subs...

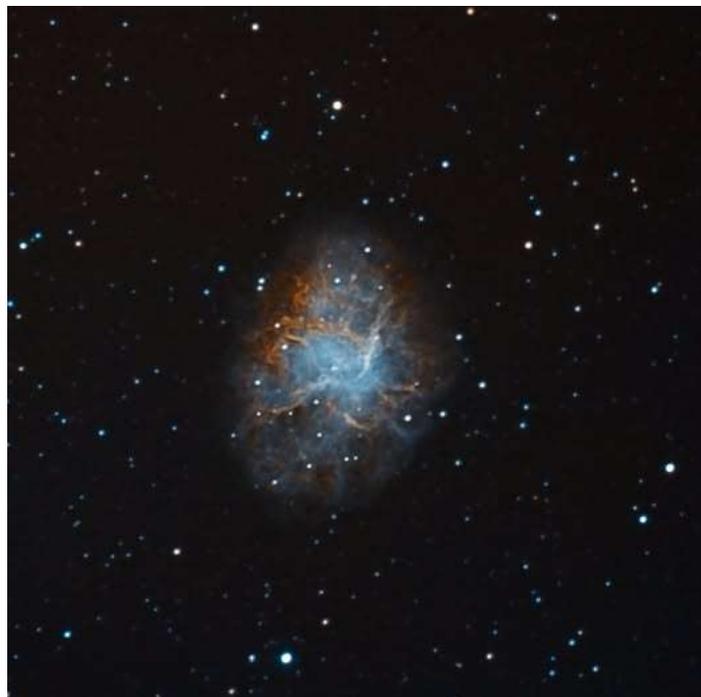
Neil Wilson



Luke Broom-Lynne



Asteroid 433 Eros is currently close to M31. Canon EosR6 ,Sigma 150-500mm zoom, set at 400mm. 60 x 20 second exposures at ISO1600.



Crab Nebula with just 10 second exposures. 20" Dobsonian, ZWO ASI533MC Pro camera, ZWO Dual Narrowband Filter. 246 x 10 second exposures (total time 41 minutes).

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

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
In the Observatory: 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 ^{**}(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. [†]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

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 January 9 th	Next Generation Smart Telescopes: Couch Based Astronomy?	Dr Simon Bennett The Widescreen Centre
Friday January 30 th	Public Open Evening	Observatory
Friday February 14 th	Women in Astronomy (Part 1) Remote talk from the Rec Centre	Mary MacIntyre FRAS SPA
Friday February 27 th	Public Open Evening	Observatory
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	TBC	
Friday April 24 th	Public Open Evening	Observatory
Friday May 8 th	Apollo	Jerry Workman G&L School Hammersmith
Friday June 12 th	Planetary Atmospheres	Professor Manoj Joshi U. of East Anglia