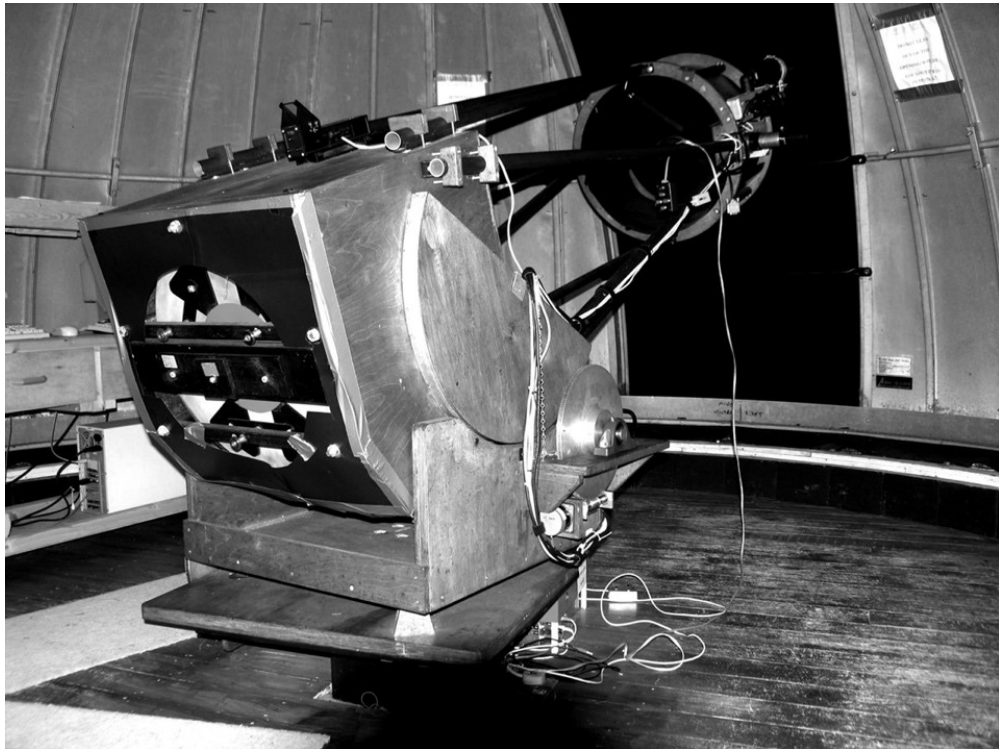


Breckland Astronomical Society

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

EXTRA ***TERRESTRIAL***

Newsletter November 2022



Registered Charity no, 1044478

| Contents | | Page |
|--|---------------------|-------------|
| Chairman's Notes | <i>Dan Self</i> | 3 |
| John's News Bits | <i>John Geonis</i> | 11 |
| Fitting and using a field flattener on a refractor telescope | <i>Chris Bailey</i> | 13 |
| Half hours with the telescope Part 4 | | |
| ANDROMEDA, CYGNUS, ETC. | <i>R A Proctor</i> | 20 |
| NASA's Webb Delivers Deepest Infrared Image of Universe Yet | | 28 |
| Gresham College Lectures | | 32 |
| Member's Astrophotography | <i>Various</i> | 34 |
| Observatory Risk Assessment 2022 | | 52 |
| For Sale and Wanted | | 57 |
| Equipment available for loan to Members | | 59 |
| Contacts | | 62 |
| Programme 2022 | <i>Dan Self</i> | 63 |

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

Chairman's Notes September and October 2022

Dear all,

We have lots of young visitor groups booked in. Please help out with a friendly bit of company on the open nights if you can. So the Lintott experience didn't happen for the umpteenth attempt (busy, lockdown, advisory travel restriction, then covid) so he has been rescheduled to the next time he can make it, Friday March 10th. Apologies from him were sent, but of course he could not help being ill. I must say David Bryant was a more than entertaining speaker, it was a stimulating evening, and a really nice atmosphere in the hall. Thanks all for coming. I hope you can all come to Quiz Night next month and invite the knowledgeable non-astronomers you know to make teams of 4 (+ children).

The 12 inch has given some amazing views of Jupiter, more crisp than the 20 inch. But the 20 inch has shown some people some new amazing views of crazily faint galaxies, such as NGC 7814 in Aquarius (a great edge on one to image), NGC 891 a lovely long edge-on galaxy in Andromeda, and Stephan's Quintet... yes they were visible to the eye (inspired by the recent JWST picture).

Twilight and Moon times for Nov and Dec 2022 (GMT) Tuesdays

| | | |
|--------|-----------------------------|-----------------------------|
| Nov 1 | sunrise 7:01 – 16:36 sunset | Astro twilight begins 18:32 |
| Nov 8 | sunrise 7:14 – 16:23 sunset | Astro twilight begins 18:21 |
| Nov 15 | sunrise 7:27 – 16:12 sunset | Astro twilight begins 18:12 |
| Nov 22 | sunrise 7:39 – 16:03 sunset | Astro twilight begins 18:05 |
| Nov 29 | sunrise 7:50 – 15:56 sunset | Astro twilight begins 18:00 |
| Dec 6 | sunrise 8:00 – 15:52 sunset | Astro twilight begins 17:58 |
| Dec 13 | sunrise 8:08 – 15:51 sunset | Astro twilight begins 17:58 |
| Dec 20 | sunrise 8:13 – 15:52 sunset | Astro twilight begins 18:00 |
| Dec 27 | sunrise 8:16 – 15:57 sunset | Astro twilight begins 18:04 |

| | |
|--------|---------------------------------------|
| Nov 8 | full moon |
| Nov 14 | moonrise 20:36, apogee |
| Nov 15 | moonrise 21:48 |
| Nov 16 | moonrise 23:03, last quarter |
| Nov 27 | moonset 19:09 |
| Nov 28 | moonset 20:39 |
| Nov 29 | moonset 22:08 |
| Nov 30 | moonset 23:35, first quarter, Lunar X |
| Dec 8 | full moon |
| Dec 13 | moonrise 20:46 (geminids) |
| Dec 14 | moonrise 22:00 (geminids) |
| Dec 15 | moonrise 23:13 |
| Dec 16 | first quarter |
| Dec 26 | moonset 19:46 |
| Dec 27 | moonset 21:17 |
| Dec 28 | moonset 22:43 |

Here are some interesting Jupiter nights

These can be viewed using Stellarium the free app for 'desktop' computers.

Nov 2 Jupiter GRS and Ganymede

Nov 3 Io shadow

Nov 9 Ganymede, Europa, GRS, Io all congregate

Nov 10 Io and shadow transit

Nov 17 Io transit

Nov 18 Callisto graze and GRS transit (late)

Nov 26 Io transit

Nov 27 Ganymede nearby Europa and shadow transit

Dec 3 Io and shadow transit

Dec 4 Europa and shadow transit

Dec 8 Ganymede shadow transit and GRS

Dec 10 Io transit and GRS

Dec 11 Europa transit

Dec 13 Europa re-emergence from behind Jupiter's dark side (7:36pm)

Dec 15 Ganymede transit and GRS

Dec 19 Io and shadow transit

Dec 26 Io transit

Dec 29 Europa and shadow transit

Dec 30 Callisto passes in front of Jupiter's S Pole grazing disc, 19:20 (GRS also visible)

Other solar system objects

Dec 5 Uranus emerges from gibbous moon 17:24 (Norwich) NW edge

Nov 30 Mars closest to Earth diameter 17.2" magnitude -1.8

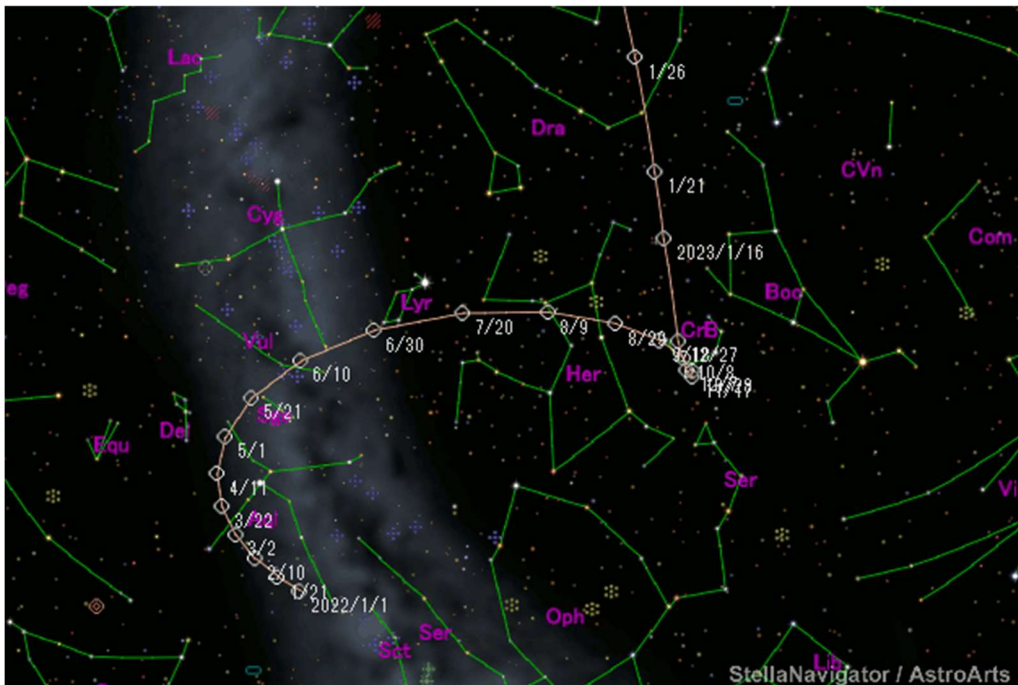
Asteroid 3 Juno is visible in Aquarius, being a magnitude fainter than Neptune above it.

Asteroid 1 Vesta is visible passing near the Helix Nebula in Aquarius, the same magnitude as Neptune, but much smaller in angular extent.

Recently, I was conducting an impromptu observation of Neptune with a new member on the 20 inch and we both could just make out the moon Triton close by, the angle checked out.

Comets

2022 E3 ZTF looks interesting. It is hanging around in Corona Borealis getting a bit low in the west until it shoots over Bootes and across Ursa Minor in January, when it will have a closer pass to Earth. The BAA comet pages don't seem so helpful as Heavens Above , but for better planning purposes Seiichi Yoshida's comet pages <http://www.aerith.net/> showed me this chart for the comet in the next few months, when brightest and closest.



spot the star! All info here.

https://www.asteroidoccultation.com/2022_12/1204_303_78112.htm

BAA Deep Sky Section Update (Callum potter)

Sorry for another short update, but still settling into our new house on Orkney following our move there early in September, and not really been keeping up to date with things on the astro-scene. I did have three nights with some clear skies - on two nights the sky was spectacular. And on another night there was a small display of the aurora. Here's a basic 30s shot of the milky way.

<https://britastro.org/wp-content/uploads/2022/10/20220921-milkyway-west-copy.jpg>

I did see that a couple of camps took place in September – AstroCamp in Wales and Autumn Equinox at Kelling Heath. I'm not sure how the observing was at these - i think the weather was a bit 'variable' - but I did see some good reports too.

September OOI (object of interest)

Many thanks to everyone that had a go at the September OOI, the planetary nebula NGC 7026. I was very interested in Robin Leadbeater's spectra of the nebula and the central star - remarkable that both could be captured.

https://britastro.org/observations/observation.php?id=20220925_214433_9fb7b9c36516d29a

And Kevin Gurney had a nice image which he took in France.

https://britastro.org/observations/observation.php?id=20220908_142706_66ee6e2cab2645fc

And thanks to Jim Latham for his visual observation, Jim writes:

'We had a fine night here on 19th September with good transparency and seeing. NGC 7026 was easily located with the 14" and at x178 showed as a small, 'double nebula'. It took higher magnification very well, and at x340 it took the form of a rather irregular oval patch of light elongated N-S with much brighter long-edges marking out the bipolar structure; this was all set within a much fainter outer nebulosity also extended N-S. Very subtle 'fibrous' detail was suggested throughout, with a concentration within the SE edge that may be a superimposed star. I couldn't resist popping in my newly acquired x2 barlow to give a rather audacious x680. To my surprise the view was even better, the nebula still bright and the details enhanced - what a rare night of good seeing can do!'

Object of Interest for October

For October I have alighted on IC 1613, an irregular dwarf galaxy in Cetus, and a member of our local group. A low surface brightness object, it will be a challenge. We have one image by Grant Privett in

the image library so more would be appreciated. *Ed: I have photographed this mysterious object on the 20" – it is a fine challenge for visual observation, probably appearing as a fuzzy blob!*

https://britastro.org/observations/observation.php?id=20190127_000000_908b598f3bf4eeec

Clear, dark skies, Callum Potter

Events

Our open evening in August was a great atmosphere and lots of new people view things as the clouds started to clear. Events like these provide a great service to the community, sincere thanks to those who helped out. September, however, was a washout.

Mick Ladner and me are giving a workshop on astrophotography for camera users on Tuesday 8th at the camera club in Rocklands.

There are many online talks these days but a couple of friendly faces that came into a few of our pandemic zoom sessions, Roger Hyman from Somerset, and Rachael Wood from Doncaster are now appearing in a Monday night YouTube streamed 'programme' *Space Oddities*, which is well worth a look at 8pm Mondays. There is a friendly small crew of mainly astrophotographers that run the broadcast, which has a nice atmosphere to it.

Talks – Quiz Night and Flat Earthers

The September talk was a bit about the mechanism of how we see the northern lights by Dan Self and we had self-made expert James Rowley Hill, a local aurora photographer, showed us all about how to see the aurora from Norfolk. He runs a facebook group AUK - Aurora UK which is 20,000 strong with very good latest advice on seeing the aurora. He is based in Happisburgh. He captures everything that is fleetingly visible from North Norfolk – it is a stunning achievement.

So Chris Lintott couldn't make it due to Covid, but we got a lovely audience for David Bryant, he was very happy to stand in and made very welcome. Him and his wife Linda got their beautiful meteorite collection out afterwards. He spoke about a subject I had thought sounded a bit provocative and otherwise explainable, but his stories led to a slight rethink, or open minded attitude.

David Bryant was a former teacher and pilot, who had made it a mission to go and meet the worlds astronauts. He delivered a frank and convincing and sensibly sceptical description of his summaries of their conversations, relevant to strange sightings they had seen. There was an X15 plane tested to go so high the pilots were classed as Astronauts, they saw several UFOs darting around on their first flight and filmed them on subsequent flights. This was prior to space being cluttered and UFOs being so trendy and they were classed as just unusual observations. Cooper from the NACA Mercury space mission saw a green orb. Then there was the Black Knight object – on a polar orbit, seen in 1960. No country at the time has a capability of achieving a polar orbit. A black triangle appeared but the film footage was classified, one picture from it got out.

Scott (Malcolm) Carpenter from the Mercury mission believed he was being watched by UFOs. He saw and felt in a state of constant surveillance. He saw bright objects that were controlled by some intelligence. He started to follow an object and nearly ran out of fuel, landing miles away. He never flew again for this reason.

David showed us some strange features on the moon, but these only seem to appear in older pictures, maybe a case of pareidolia, David said, but weird nonetheless. As a meteorite dealer, he bought a NW Australia specimen that had a metal sphere in the middle. He got it electron scanned at a university, it was 50% iron but no one could explain the high amount of aluminium and other weird elements found in it. There was an apathy in trying to explain it, that DB could not stand, it demands an explanation, so in the end he sold it to a Russian who really started to investigate it.

Jim McDivitt (who has an amazing alcohol tolerance, as in ability to remain sober) said at 5am one long night after many margheritas, that he'd seen a metallic cylinder.

Buzz said in 2014 that on Apollo 11 all 3 saw a light out of the window moving along with us. They found out the solid 4b stage was 6000 km away so it couldn't be that, but CAPCOM were telling them it must be that. It was a green cylinder shape. They tried to figure out what it was and what to do. The result of the crew's careful deliberation was to ignore it as this would result in the best outcome. They considered an N2O4 leak hallucination, Russian interference. The mission would have been terminated if they had reported it definitively so they waited, and it had gone in 2 hours. It had followed them the whole time.

Similarly, Dick Gordon from Gemini and Apollo 12, said object seen on the former mission was too close and cylindrical. He was a lovely chap who signed off a drawing by David B as accurate. Bogies seen by Lovell and Buzz on Gemini XII – two bright egg shaped UFOs. As did Gene Cernan, Edgar Mitchell, Alan Bean. All very credible people.

All these gave permission for DB to publish. I bought his book “Our Forbidden Moon: Is spaceflight denied to mankind?”

Others such as Brian O’leary (Apollo 18 lineup), Philip Corso and the former Canadian MOD director believe another race is up there that could be antagonised. That is a reason why we haven’t gone back to the moon in their eyes. To back up the US tales, word came out from the Russians also that in 1984 Salyut crew saw seven ‘angels’ who looked in the window – they were seen again 12 days later by another crew.

Next events

Coming up is Quiz Night, please invite families, friends, friend’s families, family friends and eggheads. This is the Friday 11th November. See how normal, abnormal, or entertaining Dan can make the questions this time. Please bring snacks, drinks and mirth. Teams of up to 4 adults, this doesn’t include those 18 or under. Good prizes on offer.

The December talk strays away from the usual technical style of astronomy and is about a Flat Earth conference by Dr Harry Dyer, a lecturer in education at UEA. Should be an entertaining session.

In the New Year we have the very knowledgeable Dr Matt Bothwell telling us the latest about cosmology.

Society notices

We are getting many requests for viewing nights from scouts, groups, etc. again, and would like some help at these. There are also folk out there that would like to share advice in astro equipment and use, so the more expertise or experience at hand for the new members the better. Welcome along.

We would still like a bigger committee, and more folk to come along Tuesdays and open night Fridays. The committee role isn’t necessarily a great commitment, a chat group, maybe 3 meetings a year and the AGM, but if you are local, and can spare some time and know us a bit already, it is a good cause. Without good advice, expertise and discussion the society couldn’t exist. I might not be the friendliest face to see on a Tuesday night, but I try! I am also looking to use the charity ‘Voluntary Norfolk’ for some of the little roles essential for the smooth running of the society. Thanks for those offers so far I will follow them up, apologies for being slow.

Just as a reminder, Breckland Astronomical Society are a charity that provides an educational service and inspirational experience the community can access for the price of a short road journey. We have some incredibly kind, loyal members who give lots of effort in our small crew that run the club, and I am a firm believer that, if we

can, inspiring others is part of a fulfilling life. Even if it you can spare an evening every month or so. We are always looking for helpers at open nights and events also, so if you can help at one or more of these please contact chairman@brecklandastro.org.uk

Please note Andy's address has changed. We are in the process of applying for a new account as HSBC have been deducting small amounts of money from us. Please be prepared for new account details and all being well with the application this time, to change your new year standing orders over.

We welcome the new members that just recently joined! Nice to meet you and see the enthusiasm.

Dan Self

JOHN'S NEWS BITS

November 2022

The Artemis 1 launch has now moved to November 14 after several delays. This is a large-scale collaboration between Space X and Boeing using NASA's SLS (Space Launch System).

This unmanned mission will take the Orion spacecraft around the Moon and back..

Reported in the New Scientist, the South Korean Nuclear Fusion reactor got to over 100 million deg.C for a full 30 seconds. This is 7 x hotter than the Sun. The reactor is at the Seoul National University at KSTAR (Korean Superconductivity Tokamak Advance Research) and it used improved techniques to contain the plasma at the core of the reactor. Getting close to an unlimited source of energy.

The DART mission, NASA's first test of the planetary defence system, change the direction of an asteroid by sheer kinetic force. The DART probe slammed into the asteroid Dimorphos, some 6.8 million miles away at 14,000 mph. changing its orbit around its parent asteroid Didimos by 32 minutes. The asteroid was the size of a football pitch and could level a small city.

The Juno mission to Jupiter has captured the most detailed view of Jupiter's icy moon, Europa. The ocean bearing moon could be the likeliest place in the solar system to host extra-terrestrial life. More on www.solarsystem.nasa.gov. also www.eyes.nasa.gov.

ESA's JUICE (Jupiter's Icy Moon Explorer) mission is due for a 2023 launch. This probe will go to Jupiter's moons, Ganymede, Europa and Callisto, finally going into orbit around Ganymede.

This will be followed by NASA's 'Clipper' mission on October 2024 which will do a detailed investigation of Europa to look for possible life in its liquid water ocean.

<https://sci.esa.int/web/juice>

NASA's Lucy mission to the Trojan asteroid belt went past Earth on October 16 as its first of three gravity assists to speed up its trajectory to get to the asteroids. The 12 year journey to the 9 asteroids, one in the main belt and 8 Trojans.

Trojan are asteroids that stay in Jupiter's Lagrange points orbiting the Sun..

<https://blogs.nasa.gov/lucy>

Reports in sci-news, astronomers have detected a record-breaking gamma ray burst (GRB) on October 9. This is the most energetic one ever observed and is some 2.4 billion light years away in the constellation Sagitta. GRB's are the brightest explosions known in the universe and this one was probably caused by a supernova collapsing into a black hole. Designated GRB 221009A was detected by NASA's Fermi Gamma-ray Space Telescope.

The JWST has produced some amazing images, see them on <https://webb.nasa.gov> >images.

ESA's Hera mission is a follow-up to NASA's DART mission. The spacecraft will perform a closeup survey of the Dimorphos asteroid to collect data from the recent DART impact. It will deploy two cubesats to analyse the dust created by the impact. Launch is planned for October 2024.

The Hera spacecraft will be launched on Musk's SpaceX rocket to replace the Russian Soyuz rockets as a result of the Ukraine invasion.

More on <https://www.heramission.space>

John Gionis

Fitting and using a field flattener on a refractor telescope



Field Curvature and Astrophotography

Visual observations are through the small aperture of the eye which even when the iris is wide open is only a small imaging area; also the eye/brain tends to correct any distortions that it perceives. In astrophotography we are using sensors that, due to manufacturing constraints, are on a flat surface. When a lens or telescope is focused the imaging surface is curved and therefore on a flat surface distortion occurs.

This is Petzval field curvature, named after Joseph Petzval, and describes the optical aberration in which a flat object normal to the optical axis (or a non-flat object past the hyperfocal distance) cannot be brought properly into focus on a flat image plane. Field curvature can be corrected with the use of a field

flattener; designs can also incorporate a curved focal plane like in the case of the human eye in order to improve image quality at the focal surface. It is not to be confused with flat-field correction, which refers to brightness uniformity.

Because of this, all stars are on the same focal plane... at infinity. But field curvature will curve and bend the flat sky, increasing deformation towards the edges of the frame.



The stars are not sharp and display colour separation.

Because planets are often small in the frame, field curvature is less an issue in planetary astrophotography, but when you fill the frame, like in closeups of the lunar surface or deep-sky images, the problem is real and readily visible.

How to use a Field Flattener

In theory it is easy - just screw it at the back of your telescope or insert it in the telescope using a nosepiece. That's normally it, but there are a few technical things to sort out when using a field flattener:

1. **Available back-focus**
2. **Distance between the camera sensor and the flattener**
3. **Image Circle**

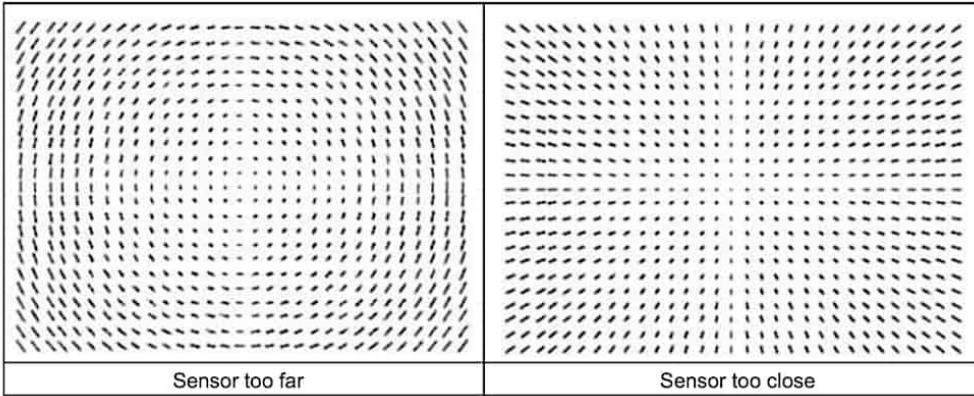
Back-Focus

Before buying a telescope and a flattener you need to verify how much back-focus is available for that combination. The back-focus is the distance between the back of the telescope and the focal plane, i.e., how far back the telescope plus flattener will focus the image. This is a critical parameter in astrophotography. To be able to focus with your camera, the camera sensor must be placed at the proper distance from the back of the instrument. If the back-focus is too long, it is not a problem: just buy some extension tubes to have the camera sensor at the required distance. But, if the back-focus is very short, you may not be able to have the camera sensor that close to the instrument and you will not be able to focus.

Set The Proper Distance

The back-focus is a nominal value, but you may need to tweak it a little bit in practice, and you can find on the market spacers of 1mm or less. Some flatteners are adjustable (e.g. William Optics IV) which make the adjustment easier.

The image below guides you in setting the proper distance between the flattener and the camera sensor by looking at the ways stars are elongated.



If you see the stars as in the left image, your sensor is too far from the back of the flattener: use a smaller extension tube. This is over corrected.

If you see the stars as in the right image, you need to increase the distance between the sensor and the field flattener. This is under corrected.

When the stars in the corners are just points on the image then the distance is correct.

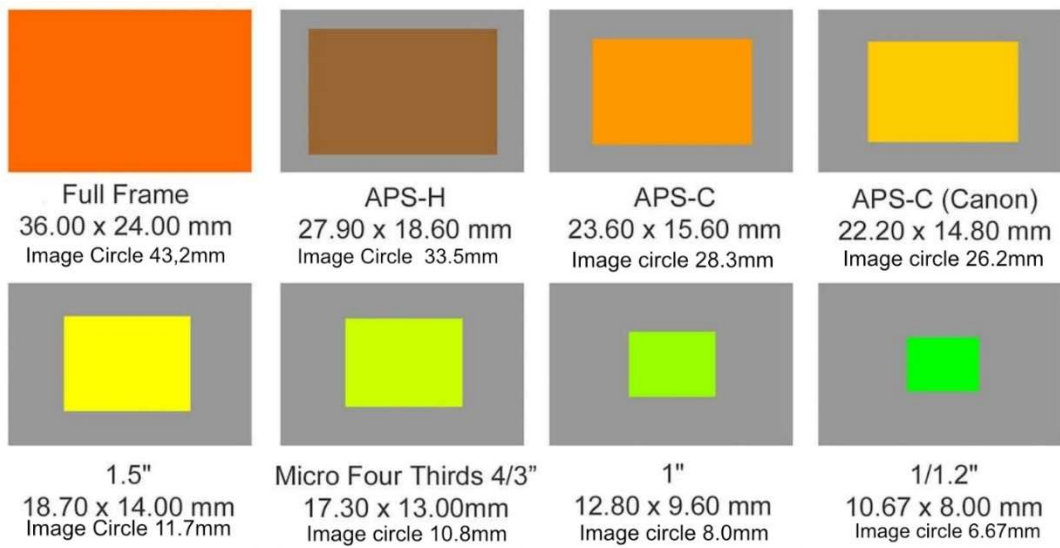


Even with dedicated flatteners and telescopes it is still worth checking this as there may be slight variations and a small change can make all the difference.

Image Circle

The field of view with a given telescope depends on the sensor size of the camera you use: the smaller the sensor, the narrower the field of view. Particularly with a DSLR and larger CCD/CMOS cameras it is important to look at the image circle the flattener can correct.

A field flattener for short focal refractors, with an image circle of 27mm, means the field is flat in a 27mm circle. This would be suitable for sensors up to the APS-C format. With a full-frame camera, this flattener will still show some field curvature at the edges of the frame.



Field Flatteners And Reducers

Some flatteners do just that: they flatten the field removing the field curvature created by the telescope.

Some flatteners are also reducers: this means that while they correct the field curvature, they also reduce the focal length of the telescope. This is often the case with long focal telescopes: they are great for the planets and the Moon, but difficult to tame for deep sky astrophotography, as they have very small fields of view and may be quite dark.

A focal reducer is the opposite of a Barlow lens and will make such instruments better suited to deep sky astrophotography by enlarging the field of view and reducing the f-ratio of the instrument, making them brighter, therefore exposures can be shorter.

Which Flattener should you buy?

Usually, field flatteners are available as specific accessories for a particular telescope. Sky-Watcher Evostar and most of the William Optics refractors have their own field flatteners. This is also true for other manufacturers. Therefore, check among the available accessories for the scope you are interested in. The field flattener is not the most affordable accessory, but it is an absolute must have for astrophotography using a refractor.

If you shop for a generic field flattener for use on a different refractor, keep in mind that the available back-focus may change with the focal length of the telescope you plan to use it with.

William Optics for the MkIV shown in the top photograph show the following distances for various WO telescopes:

FLT 98 - 76.8 mm

FLT 110 - 73.5 mm

FLT 132 - 71.5 mm

GT 102 - 76 mm

M90 - 77.3mm

Conclusion

A field flattener is an expensive piece of equipment, sometimes reaching 50% or more of the telescope's cost. But for deep sky astrophotography it is not optional: you need a flat field.

But do your homework to avoid bad surprises: when considering buying a flattener, back-focus and image circle are the main specifications you need to look at.

Chris Bailey

Half hours with the telescope

Part 4

A HALF-HOUR WITH ANDROMEDA, CYGNUS, ETC.



R A Proctor

Our last half-hour with the double stars, &c., must be a short one, as we have already nearly filled the space allotted to these objects. The observations now to be made are supposed to take place during the fourth quarter of the year,--at ten o'clock on October 23rd; or at nine on

November 7th; or at eight on November 22nd; or at seven on December 6th; or at hours intermediate to these on intermediate days.

We look first, as in former cases, for the Great Bear, now lying low down towards the north. Towards the north-east, a few degrees easterly, are the twin-stars Castor and Pollux, in a vertical position, Castor uppermost. Above these, a little towards the right, we see the brilliant Capella; and between Capella and the zenith is seen the festoon of Perseus. Cassiopeia lies near the zenith, towards the north, and the Milky Way extends from the eastern horizon across the zenith to the western horizon. Low down in the east is Orion, half risen above horizon. Turning to the south, we see high up above the horizon the square of Pegasus. Low down towards the south-south-west is Fomalhaut, pointed to by [beta] and [alpha] Pegasi. Towards the west, about half-way between the zenith and the horizon, is the noble cross in Cygnus; below which, towards the left, we see Altair, and his companions [beta] and [gamma] Aquilæ: while towards the right we see the brilliant Vega.

During this half-hour we shall not confine ourselves to any particular region of the heavens, but sweep the most conveniently situated constellations.

First, however, we should recommend the observer to try and get a good view of the great nebula in Andromeda, which is not conveniently situated for observation, but is so high that after a little trouble the observer may expect a more distinct view than in the previous quarter. He will see [beta] Andromedæ towards the south-east, about 18° from the zenith, [mu] and [nu] nearly in a line towards the zenith, and the nebula about half-way between [beta] and the zenith.

With a similar object it will be well to take another view of the great cluster in Perseus, about 18° from the zenith towards the east-north-east, the cluster being between [delta] Cassiopeiæ and [alpha] Persei.

Not very far off is the wonderful variable Algol, now due east, and about 58° above the horizon. The variability of this celebrated object was doubtless discovered in very ancient times, since the name Al-gol, or "the Demon" seems to point to a knowledge of the peculiarity of this "slowly winking eye." To Goodricke, however, is due the rediscovery of Algol's variability. The period of variation is 2d. 20h. 48m.; during 2h. 14m. Algol appears of the second magnitude; the remaining 6-3/4 hours are occupied by the gradual decline of the star to the fourth magnitude, and its equally gradual return to the second. It will be found easy to watch the variations of this singular object, though, of course, many of the minima are attained in the daytime. The following may help the observer:--

On October 8th, 1867, at about half-past eleven in the evening, I noticed that Algol had reached its minimum of brilliancy. Hence the next minimum was attained at about a quarter-past eight on the evening of October 11th; the next at about five on the evening of October 14th, and so on. Now, if this process be carried on, it will be found that the next evening minimum occurred at about 10h. on the evening of October 31st, the next at about 11h. 30m. on the evening of November 20th. Thus at whatever hour any minimum occurs, another occurs six weeks and a day later, at about the same hour. This would be exact enough if the period of variation were exactly 2d. 20m. 48s., but the period is nearly a minute greater, and as there are fifteen periods in six weeks and a day, it results that there is a difference of about 13m. in the time at which the successive recurrences at nearly the same hour take place. Hence we are able to draw up the two following Tables, which will suffice to give all the minima conveniently observable

during the next two years. Starting from a minimum at about 11h. 45m. on November 20th, 1867, and noticing that the next 43-day period (with the 13m. added) gives us an observation at midnight on January 2nd, 1868, and that successive periods would make the hour later yet, we take the minimum next after that of January 2nd, viz. that of January 5th, 1868, 8h. 48m., and taking 43-day periods (with 13m. added to each), we get the series--

h. m.

Jan. 5, 1868, 8 45 P.M.
 Feb. 17, ----, 8 58 ----
 Mar. 31, ----, 9 11 ----
 May 13, ----, 9 24 ----
 June 25, ----, 9 37 ----
 Aug. 7, ----, 9 50 ----
 Sept. 19, ----, 10 3 ----
 Nov. 1 ----, 10 16 ----
 Dec. 14, ----, 10 29 ----
 Jan. 26, 1869, 10 42 ----
 Mar. 10, ----, 10 25 ----
 Mar. 13, ----, 7 43 ----[7]
 Apr. 25, ----, 7 56 ----
 June 7, ----, 8 9 ----
 July 20, ----, 8 22 ----
 Sept. 1, ----, 8 35 ----
 Oct. 14, ----, 8 48 ----
 Nov. 26, ----, 9 1 ----
 Jan. 8, 1870, 9 14 ----
 Feb. 20, ----, 9 27 ----

From the minimum at about 10 P.M. on October 31st, 1867, we get in like manner the series--

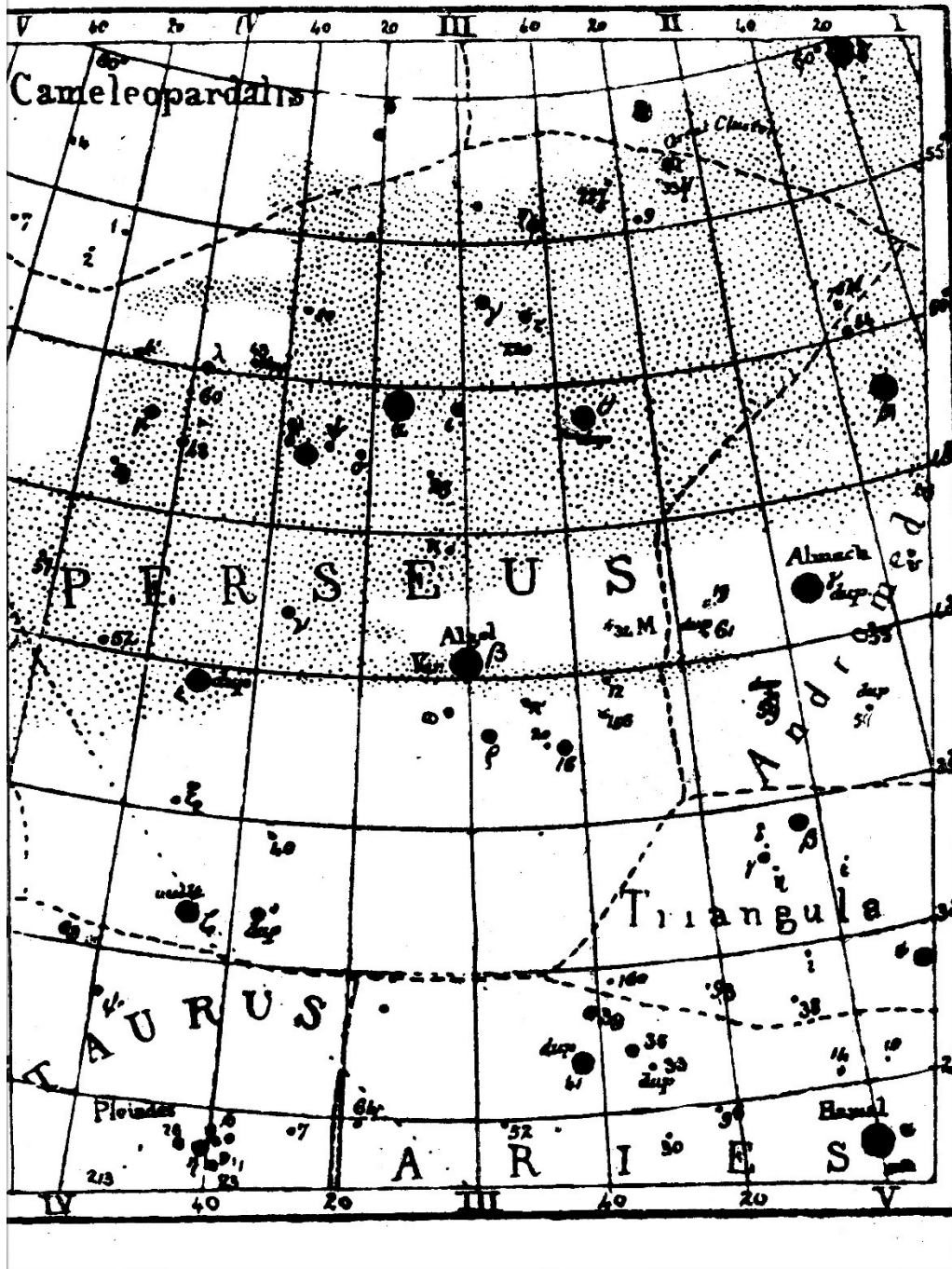
h. m.

Dec. 13, 1867, 10 13 P.M.
 Jan. 25, 1868, 10 26 ---
 Mar. 8, ----, 10 39 ----
 Apr. 20, ----, 10 52 ----
 June 2, ----, 11 5 ----
 June 5, ----, 7 53 ----[8]
 July 18, ----, 8 6 ----
 Aug. 30, ----, 8 19 ----
 Oct. 12, ----, 8 32 ----
 Nov. 24, ----, 8 45 ----
 Jan. 6, 1869, 8 58 ----
 Feb. 18, ----, 9 11 ----
 Apr. 2, ----, 9 24 ----
 May 15, ----, 9 37 ----
 June 27, ----, 9 50 ----
 Aug. 9, ----, 10 3 ----
 Sept. 21, ----, 10 16 ----
 Nov. 3, ----, 10 29 ----
 Dec. 16, ----, 10 42 ----
 Jan. 28, 1870, 10 55 ----

From one or other of these tables every observable minimum can be obtained. Thus, suppose the observer wants to look for a minimum during the last fortnight in August, 1868. The first table gives him no information, the latter gives him a minimum at 8h. 19m. P.M. on August 30; hence of course there is a minimum at 11h. 31m. P.M. on August 27; and there are no other conveniently observable minima during the fortnight in question.

The cause of the remarkable variation in this star's brilliancy has been assigned by some astronomers to the presence of an opaque secondary, which transits Algol at regular intervals; others have adopted the view that Algol is a luminous secondary, revolving around an opaque primary. Of these views the former seems the most natural and satisfactory. It points to a secondary whose mass bears a far greater proportion to that of the primary, than the mass even of Jupiter bears to the sun; the shortness of the period is also remarkable. It may be noticed that observation points to a gradual diminution in the period of Algol's variation, and the diminution

seems to be proceeding more and more rapidly. Hence (assuming the existence of a dark secondary) we must suppose that either it travels in a resisting medium which is gradually destroying its motion, or that there are other dependent orbs whose attractions affect the period of this secondary. In the latter case the decrease in the period will attain a limit and be followed by an increase.



However, interesting as the subject may be, it is a digression from telescopic work, to which we now return. Within the confines of the Map above is seen the fine star [gamma] Andromedæ. At the hour of our observations it lies high up towards E.S.E. It is seen as a double star with very moderate telescopic power, the distance between the components being upwards of 10"; their magnitudes 3 and 5-1/2, their colours orange and green. Perhaps there is no more interesting

double visible with low powers. The smaller star is again double in first-class telescopes, the components being yellow and blue according to some observers, but according to others, both green.

Below γ Andromedæ lie the stars β and γ Triangulorum, γ a fine naked-eye triple (the companions being δ and η Triangulorum), a fine object with a very low power. To the right is α Triangulorum, certainly less brilliant than β . Below α are the three stars α , β , and γ Arietis, the first an unequal and difficult double, the companion being purple, and only just visible (under favourable circumstances) with a good 3-inch telescope; the last an easy double, interesting as being the first ever discovered (by Hook, in 1664), the colours of components white and grey.

Immediately below α Arietis is the star α Ceti, towards the right of which (a little lower) is Mira, a wonderful variable. This star has a period of 331-1/3 days; during a fortnight it appears as a star of the 2nd magnitude,--on each side of this fortnight there is a period of three months during one of which the star is increasing, while during the other it is diminishing in brightness: during the remaining five months of the period the star is invisible to the naked eye. There are many peculiarities and changes in the variation of this star, into which space will not permit me to enter.

Immediately above Mira is the star α Piscium at the knot of the Fishes' connecting band. This is a fine double, the distance between the components being about 3-1/2", their magnitudes 5 and 6, their colours pale green and blue.

Close to γ Aquarii (see Frontispiece, Map 4), above and to the left of it, is the interesting double ζ Aquarii; the distance between the components is about 3-1/2", their magnitudes 4 and 4-1/2, both whitish yellow. The period of this binary seems to be about 750 years.

Turning next towards the south-west we see the second-magnitude star ϵ Pegasi, some 40° above the horizon. This star is a wide but not easy double, the secondary being only of the ninth magnitude; its colour is lilac, that of the primary being yellow.

Towards the right of ϵ Pegasi and lower down are seen the three fourth-magnitude stars which mark the constellation Equuleus. Of these the lowest is α , to the right of which lies ϵ Equulei, a fifth-magnitude star, really triple, but seen as a double star with

ordinary telescopes. The distance between the components is nearly 11", their colours white and blue, their magnitudes 5-1/2 and 7-1/2. The primary is a very close double, which appears, however, to be opening out rather rapidly.

Immediately below Equuleus are the stars α^1 and α^2 Capricorni, seen as a naked-eye double to the right of and above β . Both α^1 and α^2 are yellow; α^2 is of the 3rd, α^1 of the 4th magnitude; in a good telescope five stars are seen, the other three being blue, ash-coloured, and lilac. The star β Capricorni is also a wide double, the components yellow and blue, with many telescopic companions.

To the right of Equuleus, towards the west-south-west is the constellation Delphinus. The upper left-hand star of the rhombus of stars forming the head of the Delphinus is the star γ Delphini, a rather easy double. the components being nearly 12" apart, their magnitudes 4 and 7, their colours golden yellow and flushed grey.

Turn we next to the charming double Albireo, on the beak of Cygnus, about 36° above the horizon towards the west. The components are $34\frac{1}{2}''$ apart, their magnitudes 3 and 6, their colours orange-yellow, and blue. It has been supposed (perhaps on insufficient evidence) that this star is merely an optical double. It must always be remembered that a certain proportion of stars (amongst those separated by so considerable a distance) must be optically combined only.

The star $[\chi]$ Cygni is a wide double (variable) star. The components are separated by nearly $26''$, their magnitudes 5 and 9, their colours yellow and light blue. $[\chi]$ may be found by noticing that there is a cluster of small stars in the middle of the triangle formed by the stars $[\gamma]$, $[\delta]$, and $[\beta]$ Cygni (see Map 4, Frontispiece), and that $[\chi]$ is the nearest star of the cluster to $[\beta]$. The star $[\phi]$ Cygni, which is just above and very close to $[\beta]$ (Albireo), does not belong to the cluster. $[\chi]$ is about half as far again from $[\phi]$ as $[\phi]$ from Albireo. But as $[\chi]$ descends to the 11th magnitude at its minimum the observer must not always expect to find it very easily. It has been known to be invisible at the epoch when it should have been most conspicuous. The period of this variable is 406 days.

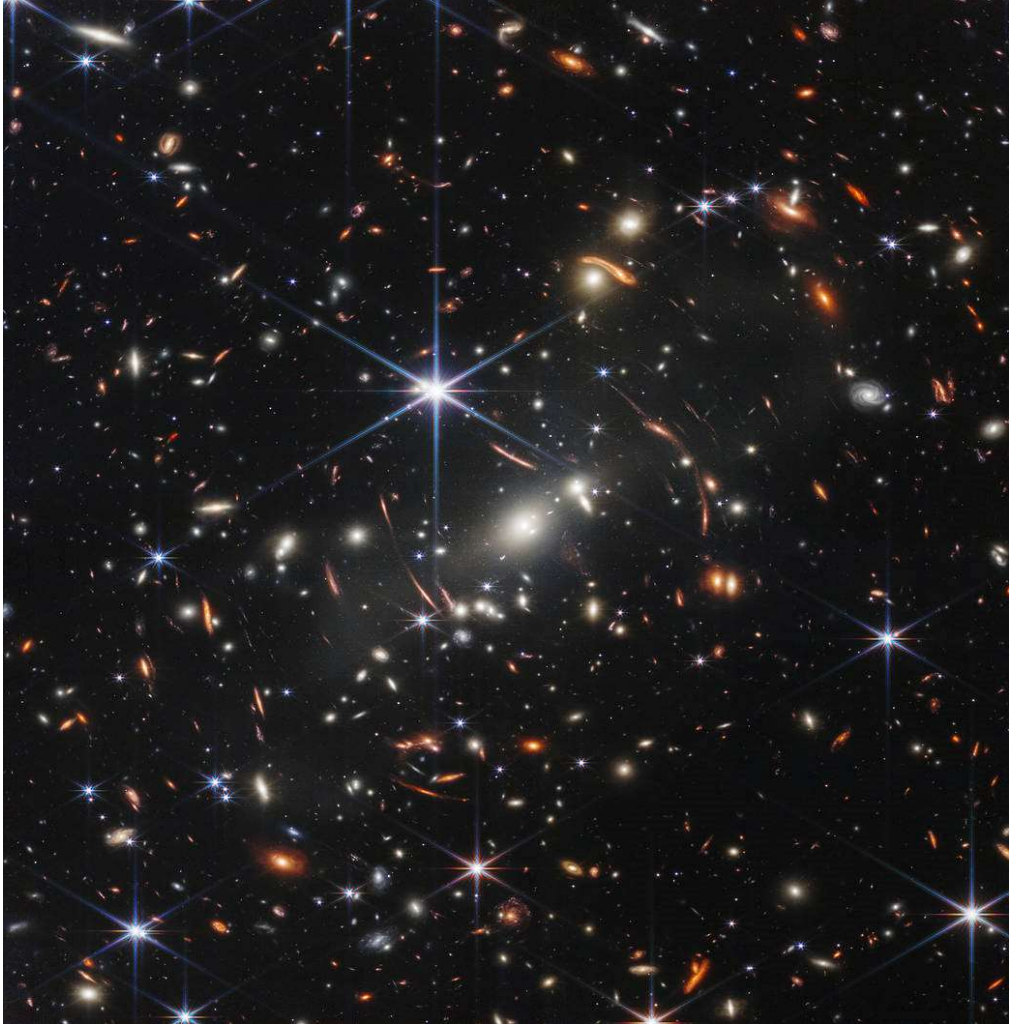
The star 61 Cygni is an interesting one. So far as observation has yet extended, it would seem to be the nearest to us of all stars visible in the northern hemisphere. It is a fine double, the components nearly equal ($5\frac{1}{2}$ and 6), both yellow, and nearly $19''$ apart. The period of this binary appears to be about 540 years. To find 61 Cygni note that $[\epsilon]$ and $[\delta]$ Cygni form the diameter of a semicircle divided into two quadrants by $[\alpha]$ Cygni (Arides). On this semicircle, on either side of $[\alpha]$, lie the stars $[\nu]$ and $[\alpha]$ Cygni, $[\nu]$ towards $[\epsilon]$. Now a line from $[\alpha]$ to $[\nu]$ produced passes very near to 61 Cygni at a distance from $[\nu]$ somewhat greater than half the distance of $[\nu]$ from $[\alpha]$.

The star $[\mu]$ Cygni lies in a corner of the constellation, rather farther from $[\zeta]$ than $[\zeta]$ from $[\epsilon]$ Cygni. A line from $[\epsilon]$ to $[\zeta]$ produced meets $[\kappa]$ Pegasi, a fourth-magnitude star; and $[\mu]$ Cygni, a fifth-magnitude star, lies close above $[\kappa]$ Pegasi. The distance between the components is about $5\frac{1}{2}''$, their magnitudes 5 and 6, their colours white and pale blue.

The star $[\psi]$ Cygni may next be looked for, but for this a good map of Cygnus will be wanted, as $[\psi]$ is not pointed to by any well-marked stars. A line from $[\alpha]$, parallel to the line joining $[\gamma]$ and $[\delta]$, and about one-third longer than that line, would about mark the position of $[\psi]$ Cygni. The distance between the components of this double is about $3\frac{1}{2}''$, their magnitudes $5\frac{1}{2}$ and 8, their colours white and lilac.

Lastly, the observer may turn to the stars $[\gamma]_{\{1\}}$ and $[\gamma]_{\{2\}}$ Draconis towards the north-west about 40° above the horizon They form a wide double, having equal (fifth-magnitude) components, both grey.

NASA's Webb Delivers Deepest Infrared Image of Universe Yet



NASA's James Webb Space Telescope has delivered the deepest and sharpest infrared image of the distant universe so far. Webb's First Deep Field is galaxy

cluster SMACS 0723, and it is teeming with thousands of galaxies – including the faintest objects ever observed in the infrared.

Webb's image is approximately the size of a grain of sand held at arm's length, a tiny sliver of the vast universe. The combined mass of this galaxy cluster acts as a gravitational lens, magnifying more distant galaxies, including some seen when the universe was less than a billion years old. This deep field, taken by Webb's Near-Infrared Camera (NIRCam), is a composite made from images at different wavelengths, totalling 12.5 hours – achieving depths at infrared wavelengths beyond the Hubble Space Telescope's deepest fields, which took weeks. And this is only the beginning. Researchers will continue to use Webb to take longer exposures, revealing more of our vast universe.

This image shows the galaxy cluster SMACS 0723 as it appeared 4.6 billion years ago, with many more galaxies in front of and behind the cluster. Much more about this cluster will be revealed as researchers begin digging into Webb's data. This field was also imaged by Webb's Mid-Infrared Instrument (MIRI), which observes mid-infrared light.

Webb's NIRCam has brought distant galaxies into sharp focus – they have tiny, faint structures that have never been seen before, including star clusters and diffuse features.

Light from these galaxies took billions of years to reach us. We are looking back in time to within a billion years after the big bang when viewing the youngest galaxies in this field. The light was stretched by the expansion of the universe to infrared wavelengths that Webb was designed to observe. Researchers will soon begin to learn more about the galaxies' masses, ages, histories, and compositions.

Other features include the prominent arcs in this field. The powerful gravitational field of a galaxy cluster can bend the light rays from more distant galaxies behind it, just as a magnifying glass bends and warps images. Stars are also captured with prominent diffraction spikes, as they appear brighter at shorter wavelengths.

Webb's MIRI image offers a kaleidoscope of colours and highlights where the dust is – a major ingredient for star formation, and ultimately life itself. Blue galaxies

contain stars, but very little dust. The red objects in this field are enshrouded in thick layers of dust. Green galaxies are populated with hydrocarbons and other chemical compounds. Researchers will be able to use data like these to understand how galaxies form, grow, and merge with each other, and in some cases why they stop forming stars altogether.

In addition to taking images, two of Webb's instruments also obtained spectra – data that reveal objects' physical and chemical properties that will help researchers identify many more details about distant galaxies in this field. Webb's Near Infrared Spectrograph (NIRSpec) micro shutter array observed 48 individual galaxies at the same time – a new technology used for the first time in space – returning a full suite of details about each. The data revealed light from one galaxy that travelled for 13.1 billion years before Webb's mirrors captured it. NIRSpec data also demonstrate how detailed galaxy spectra will be with Webb observations.

Finally, Webb's Near-Infrared Imager and Slitless Spectrograph (NIRISS) used Wide-Field Slitless Spectroscopy to capture spectra of all the objects in the entire field of view at once. Among the results, it proves that one of the galaxies has a [mirror image](#).

SMACS 0723 can be viewed near the constellation Volans in the southern sky.

Image credit: NASA, ESA, CSA, and STScI

The James Webb Space Telescope is the world's premier space science observatory. Webb will solve mysteries in our solar system, look beyond to distant worlds around other stars, and probe 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).

NASA Headquarters oversees the mission for the agency's Science Mission Directorate. NASA's Goddard Space Flight Centre in Greenbelt, Maryland, manages Webb for the agency and oversees work on the mission performed by the Space Telescope Science Institute, Northrop Grumman, and other mission

partners. In addition to Goddard, several NASA centres contributed to the project, including the agency's Johnson Space Centre in Houston; Jet Propulsion Laboratory (JPL) in Southern California; Marshall Space Flight Centre in Huntsville, Alabama; Ames Research Centre in California's Silicon Valley; and others.

NIRCam was built by a team at the University of Arizona and Lockheed Martin's Advanced Technology Centre.

Download full-resolution, uncompressed versions and supporting visuals for this image from the Space Telescope Science

Institute: <https://webbtelescope.org/contents/news-releases/2022/news-2022-035>

Courtesy of NASA

Gresham College Lectures

Astronomy Lectures in 2022-3

Cosmic Conclusions

Professor Katherine Blundell

This series includes lectures on the end of our Sun, Massive Stars and the Universe.

<https://www.gresham.ac.uk/watch-now/series/cosmic-conclusions>

The End of Planetary Atmospheres

The End of Our Sun

David Game College, Wednesday, 2 Nov 2022 - 18:00/ Online/ Watch Later – Ticketed, free

<https://www.gresham.ac.uk/whats-on/end-sun>

The End of Massive Stars

Tbc City of London, Wednesday, 18 Jan 2023 - 18:00/ Online/ Watch Later – Ticketed, free

<https://www.gresham.ac.uk/whats-on/end-stars>

The End of Life on Earth

Tbc City of London, Wednesday, 29 Mar 2023 - 18:00/ Online/ Watch Later – Ticketed, free

<https://www.gresham.ac.uk/whats-on/end-life>

The End of the Universe

Tbc City of London, Wednesday, 31 May 2023 - 18:00/ Online/ Watch Later – Ticketed, free

<https://www.gresham.ac.uk/whats-on/end-universe>

Wren 300

Sir Christopher Wren is probably the most famous Gresham Professor in history: a polymath, architect, mathematician, astronomer, anatomist and courtier. On the 300th anniversary of his death, this series will explore different aspects of his work.

<https://www.gresham.ac.uk/watch-now/series/wren-300>

Christopher Wren's Cosmos

Professor Katherine Blundell

Tbc City of London, Wednesday, 22 Feb 2023 - 18:00 / Online/ Watch Later – Ticketed, free

<https://www.gresham.ac.uk/whats-on/wren-cosmos>

The Mathematical Life of Sir Christopher Wren

Professor Sarah Hart

Tbc City of London, Tuesday, 7 Mar 2023 - 13:00 Online/ Watch Later – Ticketed, free

<https://www.gresham.ac.uk/whats-on/maths-wren>

Christopher Wren's Medical Discoveries: The Architect of Human Anatomy

Professor Jaideep Pandit

Tbc City of London, Wednesday, 17 May 2023 - 18:00/ Online/ Watch Later – Ticketed, free

<https://www.gresham.ac.uk/whats-on/wren-medical>

Sir Christopher Wren: Architect & Courtier

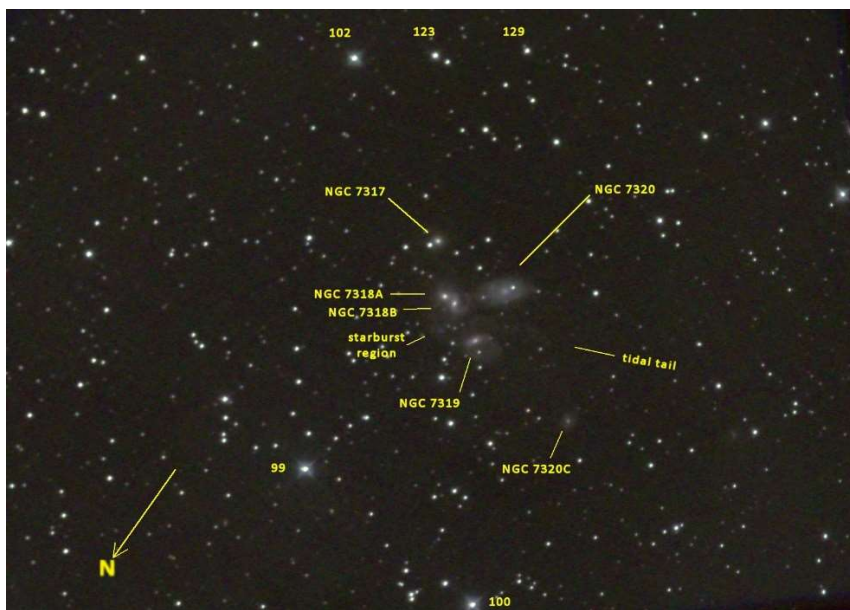
Professor Simon Thurley

Tbc City of London, Wednesday, 14 Jun 2023 - 18:00/ Online/ Watch Later – Ticketed, free

<https://www.gresham.ac.uk/whats-on/wren-courtier>

Members Astro-photographs.

Dan Self



Stefen's Quintet LRGB AtiK Camera 20" Observatory telescope



Simulation Sefen's quintet 20"



Phantom Galaxy M74 20" Observatory telescope Canon DLSR and focal reducer.



Jupiter and Ganymede Oct 8th 8" SCT ZWO Camera



Mare Crisium New 12" SCT

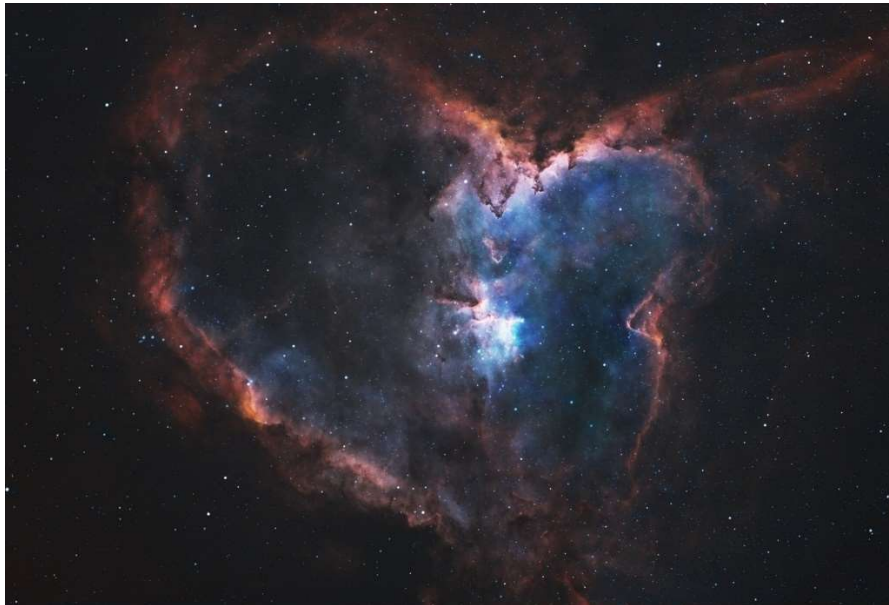
John Gionis



John Gionis

Meade SNT 10" 02-10-2022

Malcolm James Dent



IC1805 The heart nebula. 5 hours Oiii data 2 hours Ha data, Combined here for an HOO composite. Processed in Pixinsight.



The lobster claw & a bubble. 13hours total integration. 5hr,4hr,4hr from HSO filters. Processed in Pixinsight



Shark nebula 7.5hrs total RGB

Andy Weller



Cocoon Nebula. Located in the constellation of Cygnus, Also in this picture is Van den Bergh 147, which is the small bluish reflection nebula just above the Cocoon.



The deer Lick Group, 6hrs of acquisition with an OSC and C11



Bubble Nebula - NGC 7635

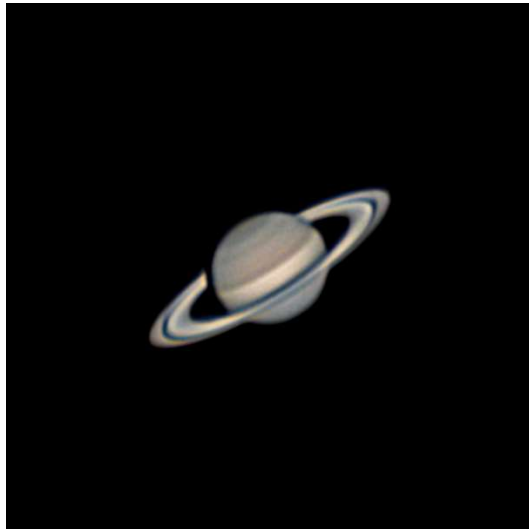
Celestron C11 @ F6.3, Skywatcher EQ8-R Pro mount, ASI294MC Pro OSC Camera, Optolong L-Ultimate LP filter , Guide cam – ASI174mm Mini + Celestron OAG

48 x 5-minute subs, 180gain @ -15c

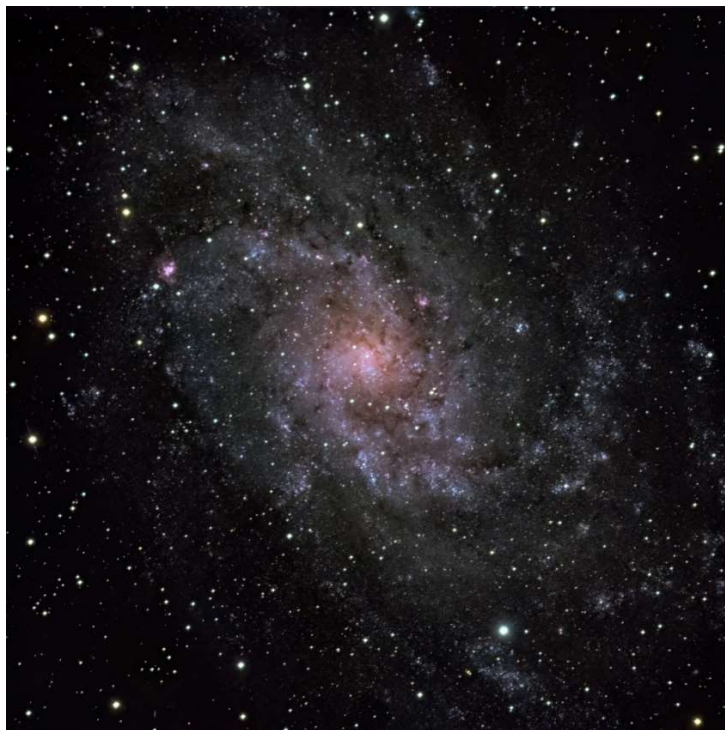
60 Darks, 60 flats and 30 Dark Flats

Stacked and processed in Pixinsight

Roger Hyman



Saturn from 2nd September '22. Processed from 10 x 2 minute videos. Autostakkert and Registax 6 images processed in Photoshop. Captured with C11 at F10 and ASI462mc.



The Triangulum William Optics Z126 and Player One SQR Saturn-C camera (100 gain). 90 minutes total integration time (180 x 30 seconds). Processing was SharpCap Pro 4, APP and Photoshop.



Heart Nebula (also known as the Running dog nebula), IC 1805, Sharpless 2-190. William Optics GT71, 68III A reducer/flattener and Saturn-C camera. 300 x 60 second exposures at 200 gain. Captured with SharpCap and processed in APP and Photoshop.



William Optics Z126 with Player One SQR Saturn-C camera (IMX533 chip). Captured with SharpCap Pro 4, ASI3 (best 10% from 500 frames), Photoshop and Topaz Suite AI.



GT71 with Televue x2.5 PowerMate and Saturn SQR-C camera. Best 10% from 500 frames in AS!3 and processed with Photoshop and Topaz Suite AI.



NGC 6992 - Eastern Veil Nebula in Cygnus. GT71 with reducer, Saturn SQR-C and Optolong Ultimate filter.

David Bryant



Jupiter and the Moon

Andrew Luck



Propeller nebula in Cygnus 5 hours of Ha data

Michael James Wilson



Canon 6D UV/IR cut filter mod, Skywatcher Evostar 72ED, F/5.8

Skywatcher Star Adventurer star tracker

1x1/800 second light exposure, ISO 200



Canon 6D UV/IR cut filter mod. Skywatcher Evostar 72ED, F/5.8

Skywatcher Star Adventurer star tracker 1x1/800 second light exposure, ISO 200



Canon 6D UV/IR cut filter mod Samyang 14mm

Sky Watcher Star Adventurer star tracker

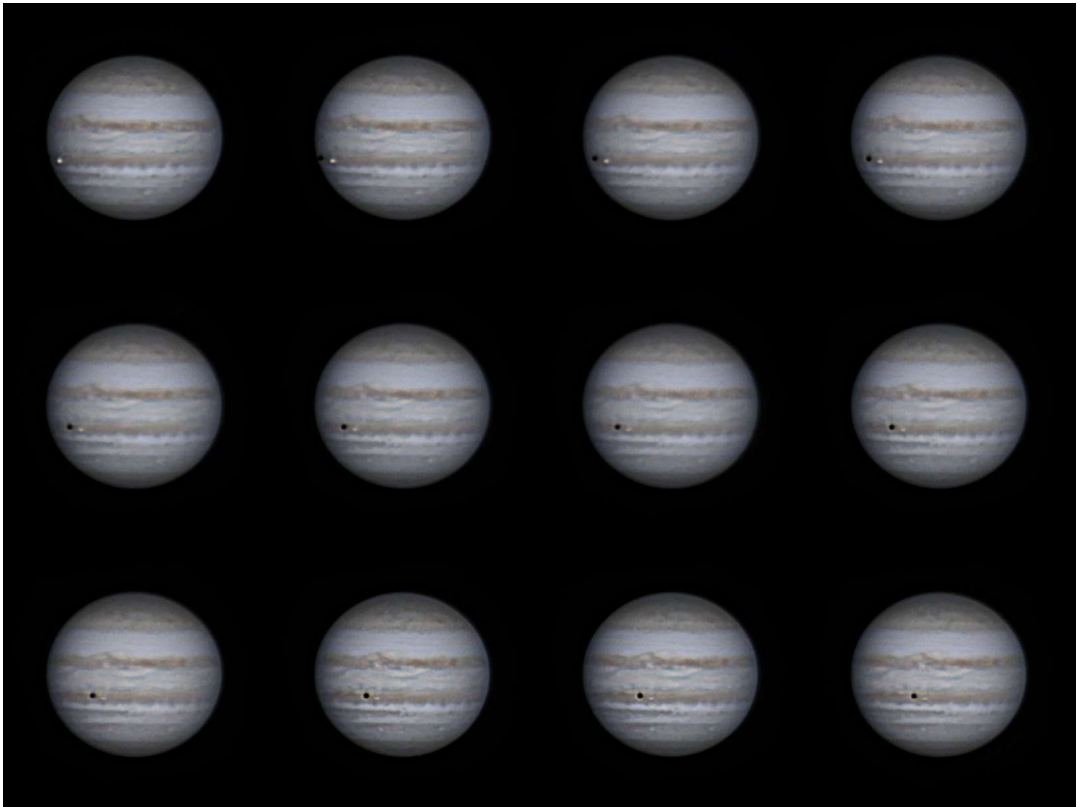
22x30 second tracked light exposures, ISO 1600, F/2.8

Mick Ladner



6 x 60 second exposures at 800 iso stacked in Starry Sky Stacker and processed in Lightroom and Topaz.

Luke Broom-Lynne

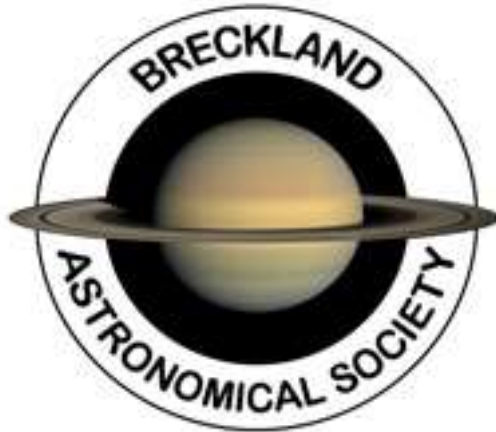


Captured every 4 minutes, showing part of Io's transit. Captured with a 250mm f/4.8 Newtonian, 3x TV barlow, ZWO ASI120MC-S. 12 frames of 60 second captures at about 70fps.

Neil Wilson



Andromeda M31 Celestron 9.25" EdgeHD + Hyperstar Altair 26C Protec camera Altair Tri-band Filter Skywatcher AZ-EQ6 mount 115 x 60sec light frames Captured with N.I.N.A.Stacked and processed with Astropixelprocessor and Photoshop.



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 2022

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>visit leaders must identify any additional hazards 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 have been 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 | Low |

| | | |
|--|--|-----------|
| | near people, or planes, only switched on briefly and used by supervisors/demonstrators only. Laser is currently broken. | |
| 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. | 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. | 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 in most months. Warm clothes to be advised to visitors. Heaters indoors if cold and keep a blanket at the observatory. | Tolerable |
| Trips and slips | Trip hazard in dark. Torch guidance will be provided but is limited because | Tolerable |

| | | |
|-------------------------------------|--|---|
| | of dark sky observing. Advised to dip and dim lights. | |
| Child protection risks (under 18s) | Two adults should be available at all times. DBS checks should be in place for group supervisors. The organisation that runs the observatory, Breckland Astronomical Society, operates a child protection policy. The committee are vigilant with regard to risks. | Low |
| Airborne viral transmission indoors | The place is fairly well ventilated with vents in toilet and loose fitting door and dome and dome floor hatch. Open internal doors Physically Distance 1m+ between groups Limit numbers to what any national guidelines state at the time. Space is quite limited. Provide outdoor activities, e.g. electronically assisted astronomy. Telescopes outdoors. | Tolerable – as we have very good ventilation. |
| Outdoor transmission | Risk is found to be low outdoors. Follow national guidelines. Be mindful of face to face breath transmission. | Tolerable |
| Surface transmission | Sanitisers are available. Wipe surfaces. Limit one to use of kitchen/bathroom area. Offer people option of using own mugs and washing up. Clean toilet regularly. | Low |
| Reporting | Not needed, ask permission, but a record of visitors names is good to keep a for any future possible information purposes. It will be destroyed before 5yrs (GDPR). | N/A |

Trustees as of 17/04/2022 are: Dr Dan Self *⁺(Chairman), Andy Jones*⁺ (Treasurer), Richard Harmon. Committee members (acting trustees): Rebecca Greef*, John Copsy. Trusted supervising members: Mick Ladner, John Gionis, Peter Farmer, Andrew Luck, Chris Bailey.

*DBS checked for day job. †Frist Aid trained for day job

Signed..... 

.....
Chairman, Breckland Astronomical Society, UKCC 1044478.

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.

SKYWATCHER SKYHAWK -1145P
PARABOLIC NEWTONIAN REFLECTING TELESCOPE.



Library Picture

Cost £250 new

Hardly been used want £100 for it if anyone is interested, please contact,

Colin Malyon

22 Oaks Drive

Necton

PE37 8LY

TEL No 01760 720313

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 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 11/4"+Filters
Atik Infinity Camera
Atik 314L+ CCD Camera (SN11003041)
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 Andy Jones
Contact treasurer@brecklandastro.org.uk

Secretary Rebecca Greef
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 – 2022-2023

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

Hall entry £2.50 £1 U18s

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|----------------------------------|---|----------------------------------|
| Friday, November 11th | Quiz Night | Dan Self |
| Friday, November 25th | Public open night | Observatory |
| Friday, December 9 th | My experience at a Flat Earth Conferance | Dr Harry Dyer |
| Friday, December 30th | Public open night | Observatory |
| Friday 13 th January | The expanding Universe | Dr Matt Bothwell |
| Friday 27 th January | Open Might | Observatory |
| Friday 10 th February | 'The Megaconstellation Threat' | Dr Paul Daniels FAS President |
| Friday 24 th February | Open Might | Observatory |
| Friday 10 th March | Citizen Science and the Zooniverse | Prof Chris Lintott |
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