

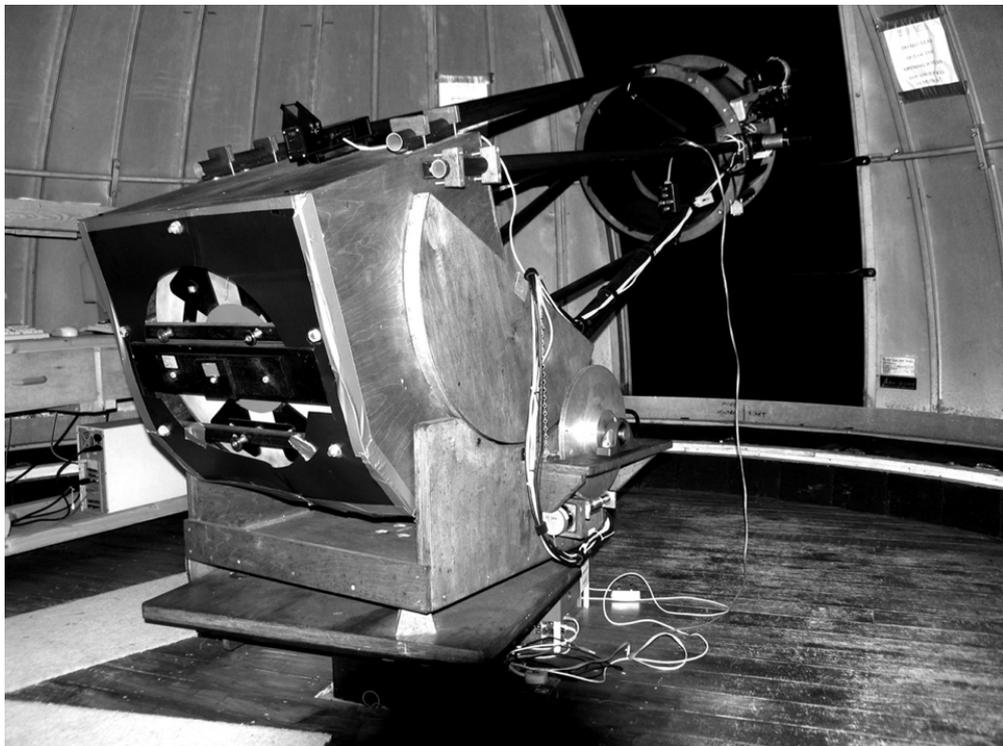


Breckland Astronomical Society

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

EXTRA ***TERRESTRIAL***

Newsletter September 2021



Registered Charity no, 1044478

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

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Chairman's Notes September 2021

Saturn and Jupiter have passed their opposition and showed more nicely than the previous year. They are both climbing Northward now, so each year we should have the opportunity of being able to see and image them more clearly. Saturn's rings are closing though, and by 2025 it will be nearing equinox, meaning we shall have a ring plane crossing in March (when it is behind the sun and another near one in November. This is great for looking for Mimas and Enceladus, the inner moons, which we miss most of the time.

In September the Moon is half phase and starts interfering with darkness from the 12th until the 27th. The evening is a lovely time to see the Milky Way of Sagittarius and Aquila. Cygnus and Lyra are always impressive. The Clair Obscur effect of the Lunar X is technically visible on the 13th, but not until the moon has almost set at 10pm. It may make a nice landscape shot with a hi res camera and telephoto lens combination.

Periodic Comet 6P/d'Arrest is sinking slowly from Ophiuchus into Sagittarius and may be visible early in the month. 67P/Churyumov-Gerasimenko is appearing in the late evening. This is the one the Philae lander on and Rosetta orbited. I'd like to see it just for that reason. It is a nice pass by earth but will probably appear a fairly mediocre comet by non-astronomers standards.

Of course for those early risers and insomniacs, the Pleiades and then Orion is back. For me Orion is a beautiful cosmic symbol of a decent all-nighter observing session.

I've tested out the Skywatcher Star Adventurer and it is solid. What isn't it my own tripod. Somehow I still managed on a windless night to get a great pic of the Deneb area, so it works! It is for the purpose of introducing you all to deeper astrophotography and is the next step after a tripod.

Now comes some logistics info. Friday September the 10th we have our next talk in the hall. The main road from Attleborough is currently closed (Aug 27th - Sep 9th) due to the roundabout and is set to open only on the day of our talk with Dr David Arditti. I really hope the roadworks are not delayed because they have decided to shut most of the surrounding roads also and the detour is about 4 miles via Deopham and towards Kerry Foods and left to Anchor Corner. It would be easier to park and walk. David has to get back to his train. We will have our AGM following the meeting.

We got back in the hall August, and Richard must be congratulated for his expertise broadcasting the livestream. We got a screenshare as well as the camera view and I could even be heard in the hall. I was most impressed. The audio was affected by a somewhat poor network signal and cut out briefly a couple of times, but it was easy to follow and very enjoyable. We must thank Andy for doing an increasingly expert job in delivering an entertaining public lecture. This time it was aimed at exploiting the maximum entertainment out of the Universe by talking about the most extreme objects.

Andy's talk was dedicated to his late dad, who had taken him to Norwich Astronomical Society when it was at Colney. It started with the caveat that this talk is of its time and would go out of date very soon. The next was a good technical point about describing distance to an object in the Universe. It is made really complicated because of the light travel time and universe's expansion changing. Here are the most extreme objects.

The most luminous star outputs as much light and radiation in 20 seconds as the sun does in a year! The largest star VY Canis Majoris is 1425 x the solar radius. It would take Voyager 1 5½ years to traverse that distance. The oldest star is nicknamed Methuselah rather than HD140283 and lives in Libra, It was measured as being older than the universe, but it must be at the edge of its error range.

“The Brightest star in a transient event” sounds a bit of an obscure record, but it was the Supernova in 1006AD. It reached -7.5 magnitude in the sky. It was thought to be a Type 1 white dwarf merger 7200 light years away in the constellation Lupus. The most luminous in absolute terms was GRB080916c – it was almost a “Neptune moment” as Andy called it, i.e. a wikiwrong, after he corrected an article about Neptune. A freakish orange blob in the largest telescopes 12.2 billion light years away somehow converted 4.9 solar masses (via $E=mc^2$) into gamma radiation in 23 minutes!

Most stars in a system was found to be 7 – located in Scorpius. It is amazing they are all still orbiting each other. The most distant exoplanet found is “Sweeps11” and located just beyond the galactic centre in Sagittarius 27000 ly away and takes 43 hours to orbit a pulsar in M4 – it has had an elaborate backstory inferred.

Our humble 8 planet solar system is now joint top in terms of number of planets, with Kepler 90. It just gained an extra one to make 8. I will jump to his last mind blowing example, as we are left with something that connects cosmology to quantum theory. The OMG particle (Oh my God) which hit Earth’s atmosphere on 15th October 1991 at 99.999 999 999 999 999 999 999 51% of the speed of light, giving it a Lorenz factor (time dilation, length contraction, etc) of 320 000 000 000 if it were a proton. That is 40 million times higher than the LHC can deliver and they mostly come from Ursa Major, the Plough.

Dan Self

JOHN'S NEWS BITS

September 2021

Finally the James Web Space telescope (JWST) has a new launch date on October 31, 2021 having completed all risk assessment issues. A very long awaited for mission. No pressure on the launch!

Scheduled for October launch is Artemis 1, the first integrated test for NASA and ESA's deep space exploration system. The Orion spacecraft on an SLS rocket will undertake an uncrewed test flight of 280,000 miles on a three week mission. Launch date will be no earlier than November 2012. The next flight will have four astronauts.

The Lucy mission to study the Trojan asteroids will launch on October 16. The 12 year journey will look at eight different asteroids, one in the main belt and the other 7 Trojans. Trojan asteroids are associated with Jupiter in two loose groups, one leading ahead of Jupiter and the other trailing.

NASA's Psyche mission to explore a metal rich asteroid is being readied for a launch in early 2022. It will arrive in early 2026. The asteroid is made of iron and nickel and is believed to be the core of an early planet. It is now at phase D stage with instrumentation and spacecraft assembly in progress.

Psyche is at 1.6AU when in apposition.

Usual press hype, it could be worth 10,000 quadrillion dollars!

A first for the ALMA telescope in Chile. Within the circumstellar disc of star PDS70 It has imaged a moon forming disc of dust surrounding a giant gas planet PDS70c in the constellation of Centaurus some 370 light years away. The work was done by the university of Chile and the university of Grenoble.

Reported in scitechdaily, researchers at the Tel Aviv university discovered a new type of massive stellar explosion, an electron-capture supernova SN2018zd. Theorised for some 40 years, this was the first to be observed. This type of supernova comes from stars some 8-9 times the mass of our sun and sheds new light on the supernova of A.D. 1054 known as the Crab Nebula which is now believed to have been an electron-capture supernova.,

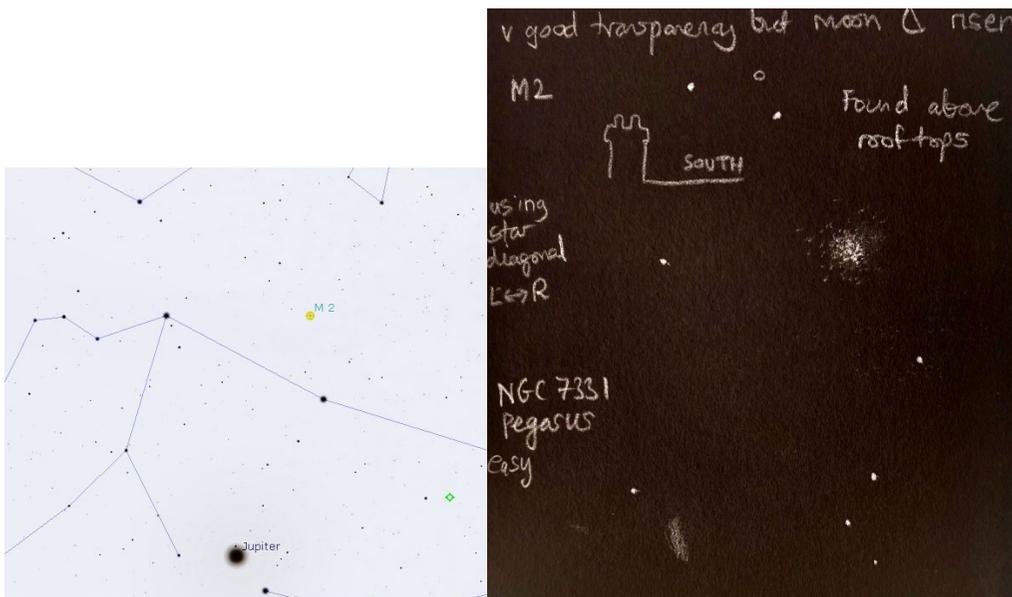
John Gionis

Some Bright and Beautiful Objects for Observers for September

A bit of backyard observing last year from my light polluted back garden (Bortle 6) in Norwich gave me a nice list of things most telescopes are capable of. It was a very clear night, with very good transparency, but there was a quarter moon just above the horizon. It was certainly not an astronomer's dream night, but a realistic scenario. This shows what can be seen in such conditions.

Globular Cluster M2 in Aquarius

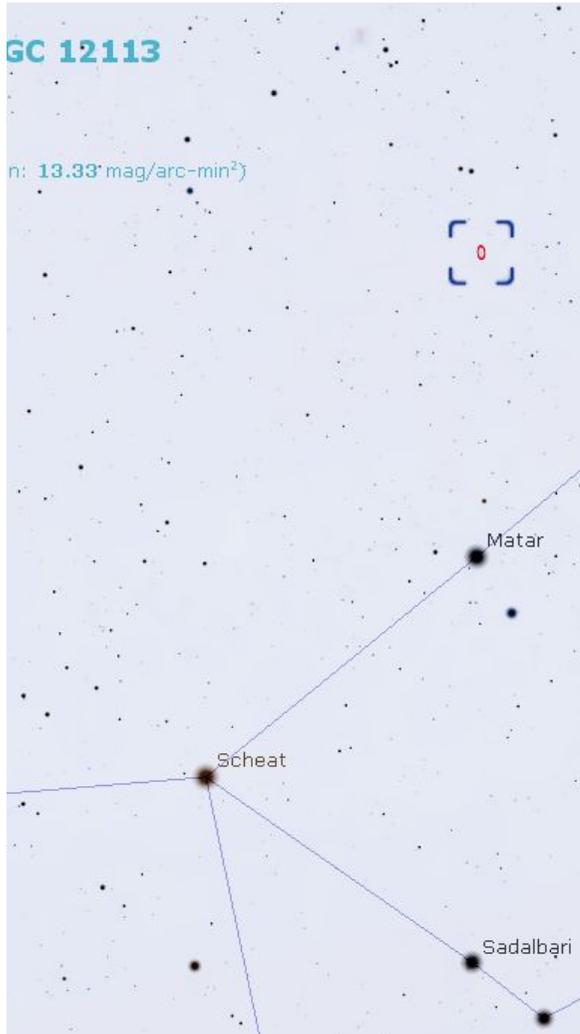
This is a pretty bright globular cluster with a tight core that's easily resolvable in an 8 inch telescope if you have the right magnification and a steady head. It should be resolvable in smaller apertures also, maybe from about 4 inches. It was first noted in 1746 by Jacques Cassini, and Messier rediscovered it in 1760. It is 5°N of beta Aquarii (Sadalsuud), is 6.3 magnitude and it is vague to describe its diameter, so I shan't. Herschel was the first to resolve stars in it in 1783. The brightest stars are magnitude 13.1. It contains about 150,000 stars of total mass 104,000x that of the sun. It is 13 billion years old (typical for a globular) and lies 55 000 light years away, way outside our Galaxy. It may not look it, but it's a big one! It has now been found to be part of the 'Gaia Sausage' the possible remains of a merged dwarf galaxy. I do like M2's convenient location in the Southern sky.



Galaxy NGC 7331 in Pegasus

It was visible! This isn't bright or beautiful but it was certainly there and easy at that. How did Messier miss this one? It was a faint smudge, yes, but from an urban location

with a moon in the sky you wouldn't have thought a non-messier galaxy would have been visible. It can be found off the top right of the Square of Pegasus. There is a little triangle of stars, and the bottom one is double. Above the top star by a similar distance to the triangle's side, is NGC 7331, also called the Deer Lick group for some unknown reason. It has some companions and half a degree to the SW is Stephan's Quintet.



Cassiopeia: Open Cluster NGC 457 'Dragonfly'

This is the ET or Dragonfly cluster just south of the 2nd star of the 'W' in Cassiopeia. The shape is quite distinct - there are two bright eyes, a linear body and some fainter wings. One of



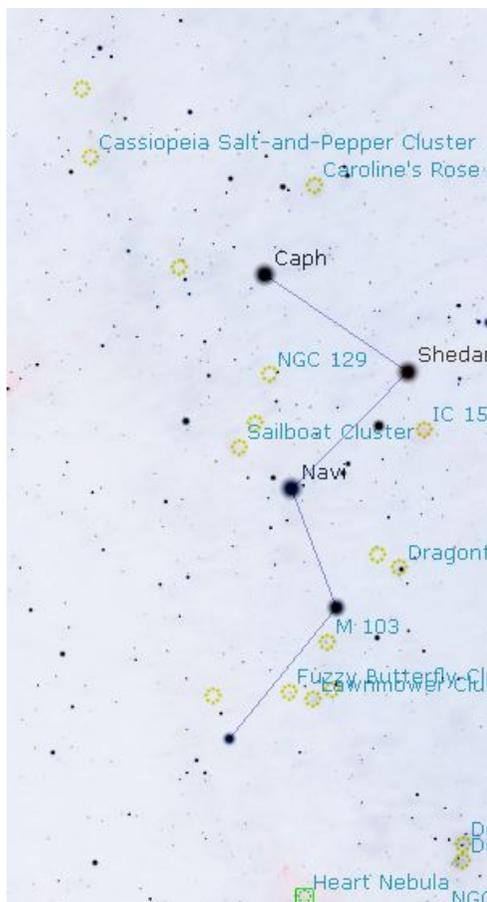
the stars in this cluster is visible to the naked eye, so this ought to impress you and your friends. One of the 'wing' stars near the centre of the cluster is a good deal redder than the majority, which are fairly bright and hot young blue stars. See if you can make out their colours. Also the star at the end of the 'tail' is a little yellower and the brightest 'eye' star is whiter. The variety in brightness to the eye is something that is really hard if not impossible to capture on camera and the twinkling adds a certain charm too. It is 8000 light years away, magnitude 6.4 and 13 arc min across.

Cassiopeia: Open Cluster M103

M103 is an overlooked triangular cluster in Cassiopeia, much more obscure and hard to find than the Dragonfly and others around it. I'm surprised that Charles Messier logged this one and not many of the other NGC clusters around it. There are a lot of stars in the cluster, over 100, but most seem fairly faint compared to 4 or 5 bright ones making up the triangular sort of shape. Messier didn't actually discover this one, he just catalogued it later. It was found by his friend Pierre Méchain in 1781, the same year as Herschel discovered Uranus. The brightest star is actually a foreground star, Struve 131 and there is a 10.8 magnitude red giant in the centre. It is 7.4 magnitude and 6 arc min and fairly distant at 9000 light years.

Cassiopeia: Open Cluster NGC 663 – 'Lawnmower'

NGC 663 is a larger, sprawling cluster in Cassiopeia. It is busy and teeming with evenly lit stars, like a distant town in a faraway world. Maybe Discworld? I always bump into this one before M103 and think this must be the Messier object. It is about 7th magnitude overall and 16 arcmin across, making it easy in binoculars. Some have seen it with the naked eye! Patrick Moore claimed this for his Caldwell catalogue as number 10. It is 7th magnitude, 16 arc minutes across and about 7000 light years away, and so part of the Cassiopeia OB8 stellar association, along with the clusters around it, M103 (above), NGC 659 and NGC 654. The latter in the list NGC 654 – the Fuzzy Butterfly Cluster is worth checking out as I didn't observe it on this night, and it looks to be a bright one.



Cassiopeia: Open Cluster NGC 7789

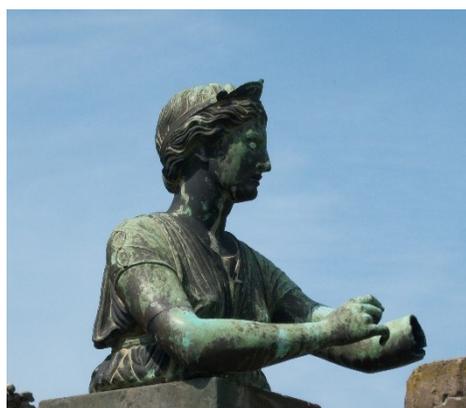
NGC 7789 is the open cluster in Cassiopeia called **Caroline's Rose**. It was discovered by Caroline Herschel in 1783. It is also known as the White Rose, although that may sound a bit Yorkist. It is fairly round on photographs, but a beautiful intricate shapes are visible by eye, and it looked elongated to me. There are a lot of burning distant nuclear furnaces all giving up their glows, and it is such an aesthetically satisfying cluster to cast your eye upon. The rose effect is



just not visibly easily when processing the image the usual way, so it leaves me wondering what the eye does to pick out those folds and swirls. A must see visually in any telescope. It lies quite near the Bubble Nebula and M52 and is a fairly big cluster about 8000 light years distant. Interestingly it is a very old star cluster, most have long dissipated by this one, but it has been found to be 1.6 BILLION years old!

Cassiopeia: Open Cluster NGC 225 'Sailboat'

NGC 225 is another open cluster in Cassiopeia and looks to me just like a dot-to-dot sailboat. Stunningly so, even from city skies. There is some very, very faint nebulosity



around there and dark lanes, only on the deepest of pictures (desert skies or 10 hours of exposure type images). The top of the sail is in a faint wisp of reflection nebula. An orangey star is at the stern of the boat. It is quite a close, looser looking star cluster 12 arc min across, 7th magnitude in total and is 2100 light years away.

Dan Self

Apollo and Artemis

This month I thought I would write about the gods Apollo and Artemis, as these are the names of NASA's lunar programs. Apollo and Artemis were twins, and the children of Leto and Zeus. They were born on the small island of Delos in the middle of the Aegean Sea, after their mother had wandered far and wide, searching for somewhere to give birth. It was said that previously Delos had been a floating island, but after the birth of the twin gods it became immovably fixed to the sea-bed. Apollo was a god of the sun, prophecy and archery, a patron of music and the arts, and a god of healing (Asclepius was his son.) Artemis was the goddess of the moon and hunting.

Apollo travelled to Mount Parnassus and at Delphi defeated with his deadly arrows a monstrous serpent called the Python, his mother's enemy. Apollo decided to set up his own shrine at Delphi and established an oracle there. A priestess, known as the Pythia, sat on a tripod above a chasm in the ground and delivered prophetic answers to questions that were brought to her. Her



words, however, were unintelligible and had to be interpreted by the priests of Apollo. Even then the words of the oracle could be ambiguous. Croesus, the wealthy king of Lydia, was planning to invade the neighbouring kingdom of Persia and came to Delphi for advice. The oracle told him that if he crossed the river dividing his land from Persia a mighty empire would fall. Too late he discovered that 'the mighty empire' was in fact his own.

Apollo's first love was a nymph called Daphne, daughter of the river-god Peneus. Unfortunately she did not return his affection and ran away from him. As he chased after and was gaining on her, Daphne came up to the river and cried out in desperation to her father. Peneus turned her into a laurel, which Apollo then made his sacred tree.



Apollo also tried to seduce Cassandra, daughter of Priam the king of Troy. He promised her the power of prophecy if she would sleep with him. Cassandra accepted the gift and then went back on her promise. As a punishment, Apollo let her keep the ability to foretell the future, but ensured that no-one would ever believe her. She told

the Trojans over and over again that the Wooden Horse was full of Greek soldiers. Her words fell on deaf ears.

Artemis is usually depicted wearing a short tunic and armed with her bow. She was a maiden goddess and spent her time in the mountains and woodlands, accompanied by her followers. One of these was Callisto who became the constellation Ursa Major. Artemis drove her away when she discovered that she was pregnant with Zeus's child.

Artemis was a vengeful goddess. A young hunter called Actaeon happened one day to wander into a glade where Artemis was bathing in a pool. Her nymphs gathered around to protect her modesty but she was taller than all of them. In a fury Artemis turned Actaeon into a stag. He was pursued by his own hounds and ripped apart by them. The dogs then roamed the woods, baying for their lost master.

When Oeneus, honoured all the she sent a huge countryside. It that Oeneus' band of intrepid The hunters Theseus, and ('Gemini'). One was present and draw the first



king of Calydon, gods but forgot Artemis, boar to ravage the caused so much havoc son Meleager gathered a heroes to hunt it down. included Jason and Castor and Pollux female hunter, Atalanta, Artemis allowed her to blood from the boar.

After many horrific injuries and at least one death, Artemis's anger cooled and she allowed Meleager to kill the beast.

Sometimes Apollo and Artemis united to punish humans. Niobe, a queen of Thebes, bore her husband seven sons and seven daughters. She was so proud of this that she dared to compare herself with Leto, who had only two children. Apollo and Artemis came armed with their bows and set about shooting with their deadly arrows all Niobe's children. Niobe herself was turned into a rock on Mount Sipylus, with water cascading down her face like tears.

Perseid Meteor Shower 2021



The Perseids are one of the brighter meteor showers of the year. They occur every year between July 17 and August 24 and tend to peak around August 9-13.

The stream of debris is called the Perseid Cloud and stretches along the orbit of the comet Swift–Tuttle. The cloud consists of particles ejected by the comet as it travels on its 133-year orbit. Most of the particles have been part of the cloud for around a thousand years. However, there is also a relatively young filament of dust in the stream that was pulled off the comet in 1865, which can give an early mini-peak the day before the maximum shower. The dimensions of the cloud in the vicinity of the Earth are estimated to be approximately 0.1 astronomical units (AU) across and 0.8 AU along the Earth's orbit, spread out by annual interactions with the Earth's gravity.

Many Perseid-related news stories and social media posts state that the maximum rate is about 100 meteors per hour, which is a lot. So, folks get excited and go out on the peak night, braving nightly hazards. But they are often disappointed; we routinely hear, “I went out and only saw a few meteors. Not even 20, much less 100!” And they would be right. The problem is that the 100 per hour is a theoretical number used by meteor scientists and does not convey what people are going to see.

In the 1980's, meteor researchers were searching for a way to compare the meteor shower rates observed by various individuals and groups across the globe. People were reporting the rates, but the differences in sky conditions, radiant altitude and observer eyesight made getting a comprehensive view of shower activity difficult.

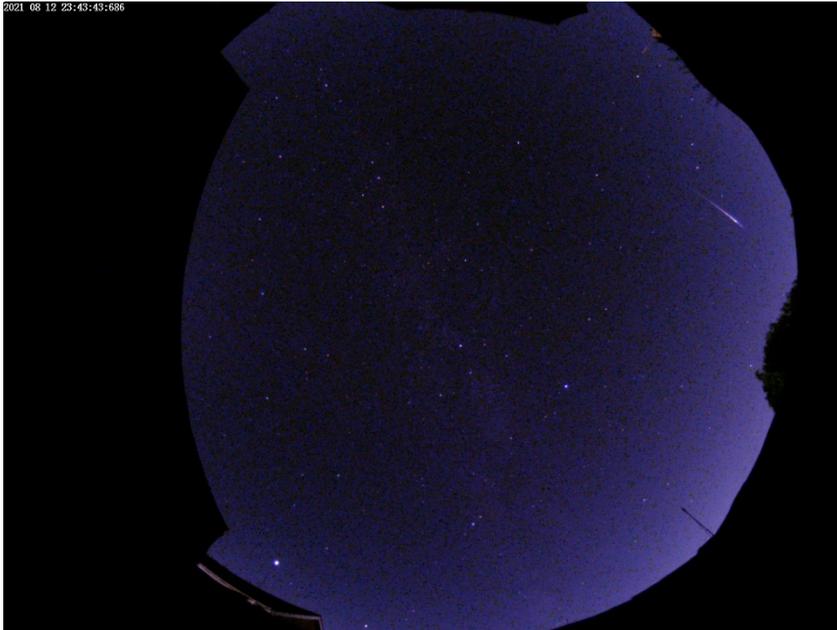
So, the meteor researchers put their heads together and came up with the concept of a ZHR, or Zenithal Hourly Rate. The ZHR is what you get after you correct the observed rates for the sky conditions, the altitude of the radiant above the horizon, and observer biases. In other words, it is basically what a perfect observer would see under perfect skies with the meteor shower radiant straight overhead – which never happens!

The often-quoted ZHRs overestimate the meteor rates people actually see – sometimes by a lot

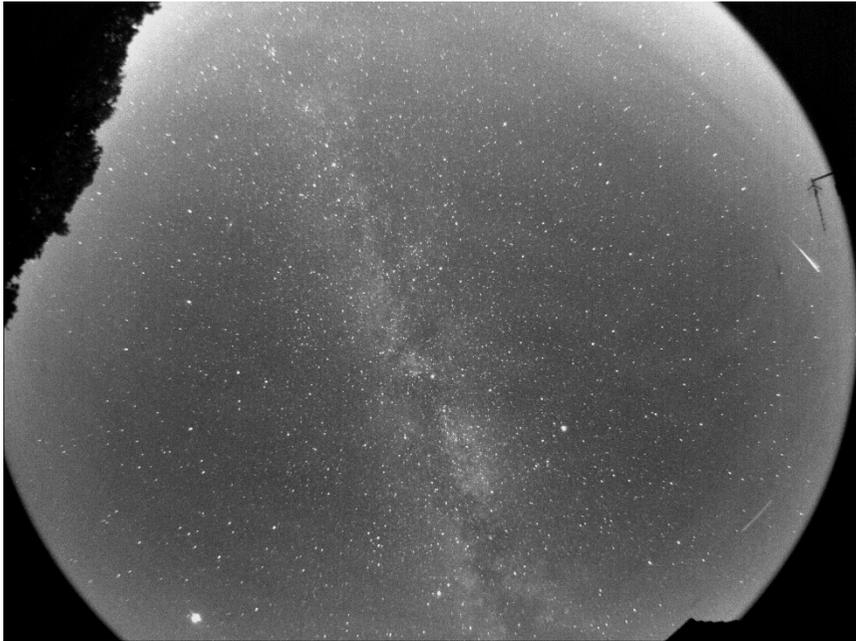
This year the shower peaked with the Moon mainly out of the way so dark skies were possible for visual sightings and imaging . There was also a couple of breaks in the clouds to allow observations to be made.

12th August 2021 23.43

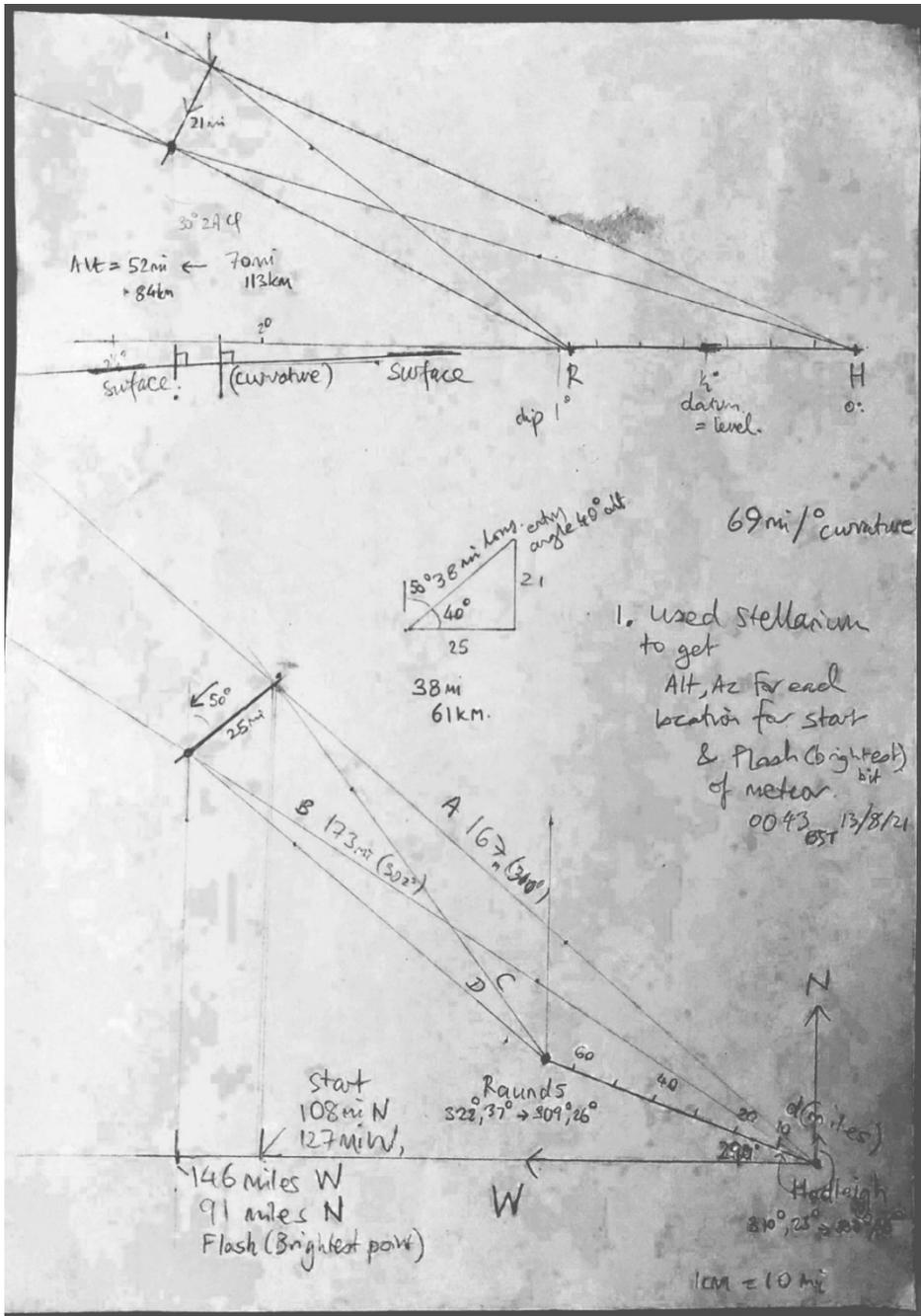
Having seen a post from Dave Eagle FRAS containing a Meteor image



I checked my images from the all-sky camera and had obtained one for the same time and similar position.

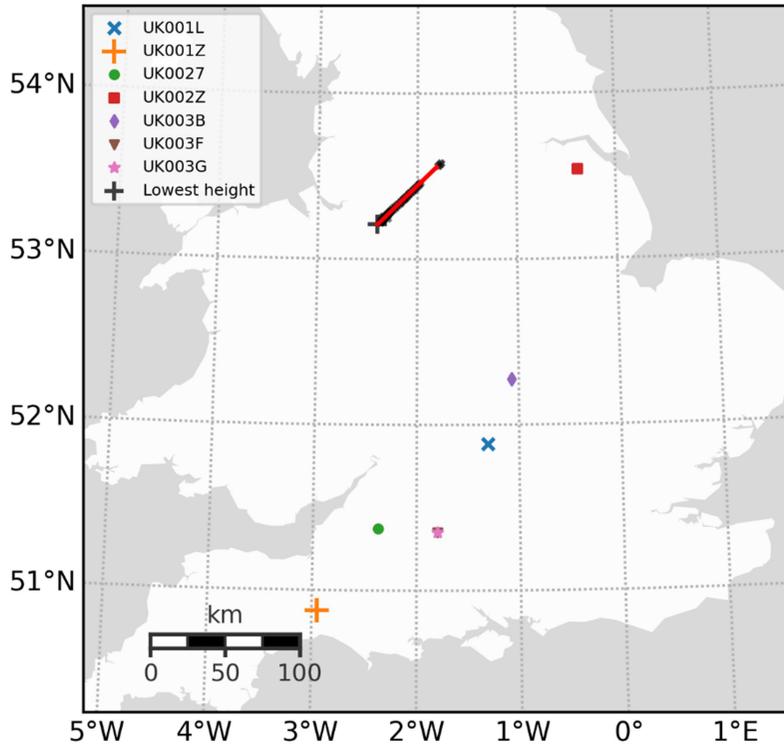


The challenge was put out to Dan to use his skills to calculate the height and position and so using protractor and string (Stellarium to get az alt 2. Google maps to get location separation and bearing 3. Get the protractor out!) he came up with the following calculation



This gave the position as over the Peak District at a height of 70 to 52 miles. This was from two observations, both at relatively low altitudes.

UK Meteor Network has a network of 50+ detection cameras watching and recording meteors over the United Kingdom. They observed from various cameras and found that the track was as below.



This is as Dan predicted over the Peak District. A camera in the Peak District did not record it as the elevation was too high. Another calculated fact was that the mass of the particle that formed the meteor trail was 0.34669g

Path Details from UKMON

start -1.81° 53.56° 127.40km

end -2.40° 53.21° 75.90km

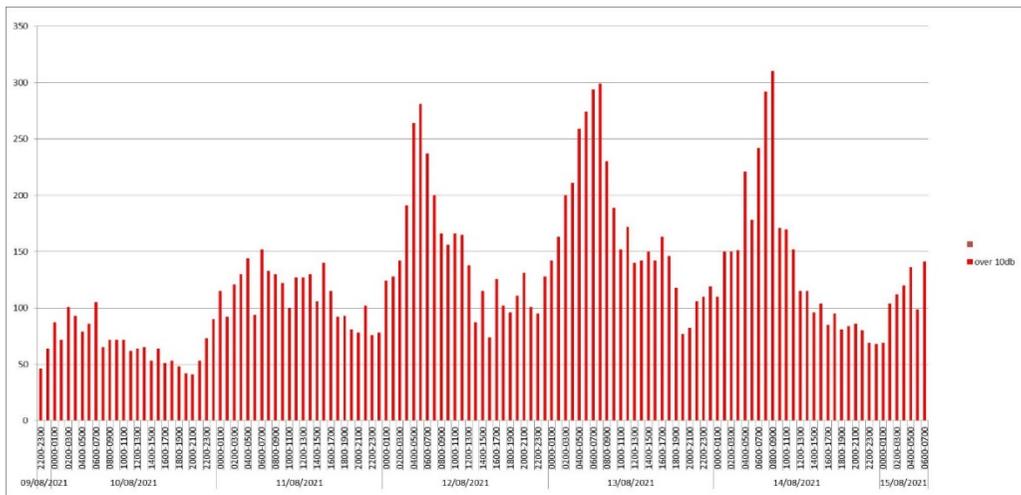
Well done Dan

Radio Observations

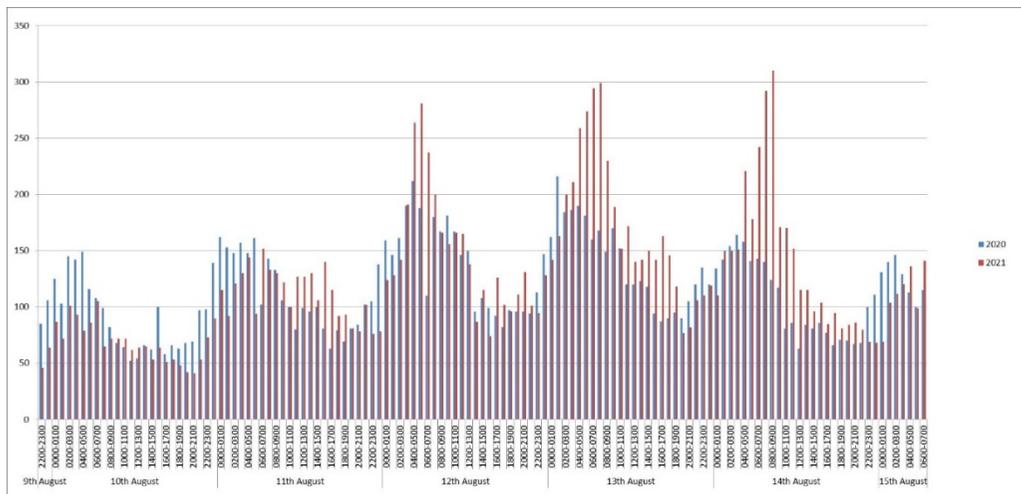
VHF Radar GRAVES

The below is the readings obtained using receiving equipment at home in Suffolk from the 9th to 15th August.

Due to being able to detect smaller meteors and the ability to detect 24/7 regardless of cloud, there are far more detected than would be seen visually. Note the highest hourly rate is actually on the 14th although in total there are more on the 13th.

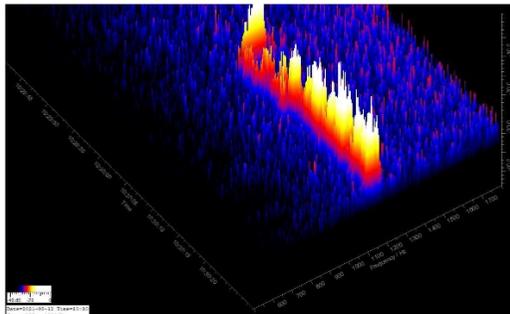
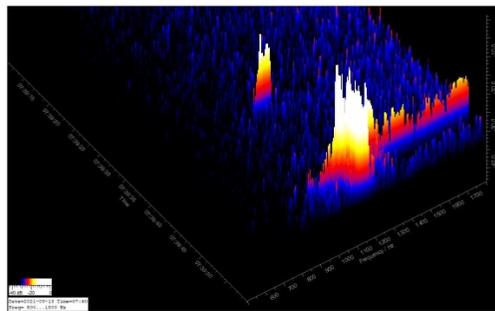


I also had the records from the same period in 2020 so a comparison was made.



The Blue columns are for 2020 As can be seen the first couple of days there was less activity in 2021 but from the 12th onwards the recordings for 2021 are higher. This is using exactly the same equipment and settings. There were more detections of the STARLINK satellites and with manual counting these were as far as possible eliminated. The system was run both before and after but other than the diurnal variations there is nothing of significance.

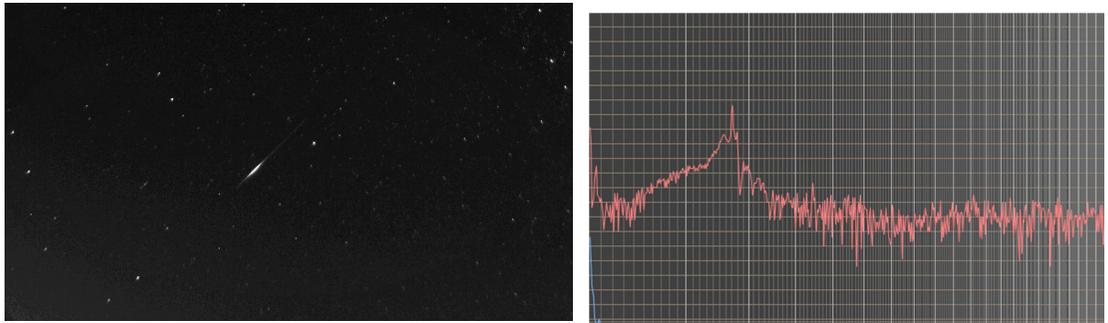
A couple of the Speclab recordings:



VLF Recordings

Due to lockdowns it has not been possible to progress the experiments in this field until now. It requires a site as far away from any interference as possible which is at least a mile from mains electricity. Therefore for me it requires travelling.

In one early morning session on the 10th, 42 possible meteor strikes were detected in VLF and of these two could be traced to images taken from the same location at the time. This does not necessarily prove the theory but does give some encouragement. Hopefully with further showers near the end of the year more work can be carried out. This uses a 25,000 turn coil antenna. I do not know of anyone currently doing this type of work so cannot compare results.



Thanks to Dave Eagle and UKMON for material reproduced.

Finding a place to observe

I am recalling some early astronomy adventures from around the year 2000. It was pre mainstream digital photography at the time and personally I really didn't like the pixelated, monochrome and noisy look of the CCD images I was seeing, so film was still all the rage. On this occasion I was visually testing out the newly acquired 8-inch SCT from Telescope House, complete with accessories. PS It's still going strong 21 years later. I was living with my parents and asked if Dad wanted to join me in a trip to find a dark site out of the city. Way before the NDR bypass or in-fill estates were being built, we were still pestered with light pollution, but perhaps we could escape a little easier. So off we drove along the Salhouse Road, past Rackheath. There was nowhere obvious to stop, due to a few big verges, trees and odd stray lights, so we headed across to the Plumstead Road down some slightly smaller lanes and found a small place to pull over with a great dark South horizon, just on the edge of a crop field.

It was a lovely clear night. After finding a few objects in the eyepiece and getting some impressive views a car came down the road. This happens from time to time and you just have to look away until it passes so it doesn't wipe out your 'night vision'. We waited it out, but it stopped and beyond the glare of the headlights we could just make out it was a police car. A short policewoman came out and in the usual serious, authoritative tone asked what we were doing.

This bit is from my perspective. My dad has always tried his best to embarrass me, and this opportunity was not one to be missed. He launched into an inappropriately jokey reply before I could get a word in. Something along the lines of "I expect you think we're spying on someone, or hunting aliens, or part of a sheep rustling operation." Or even all three of those, just to capitalise on the fun that could be had in the face of authority. I don't remember it exactly; just how inappropriate it was. I'm surprised it wasn't obvious to her, but she had to keep up her official image. Needless to say, the officer took his words literally and continued to ask what we were doing. I tried to answer "astronomy", but it took some time for her to realise this and I don't think she liked not being taken seriously, so we had to listen to a short lecture. Initially she tried to move us on, but when we finally gave a serious answer, she realised we weren't a threat or lawbreakers and let us continue. I was miffed my eyes had to reacquire night vision thanks to her headlights.

Got a story like this? Please send to newsletter@brecklandastro.org.uk.

Dan Self

Members Astrophotography

Dan Self



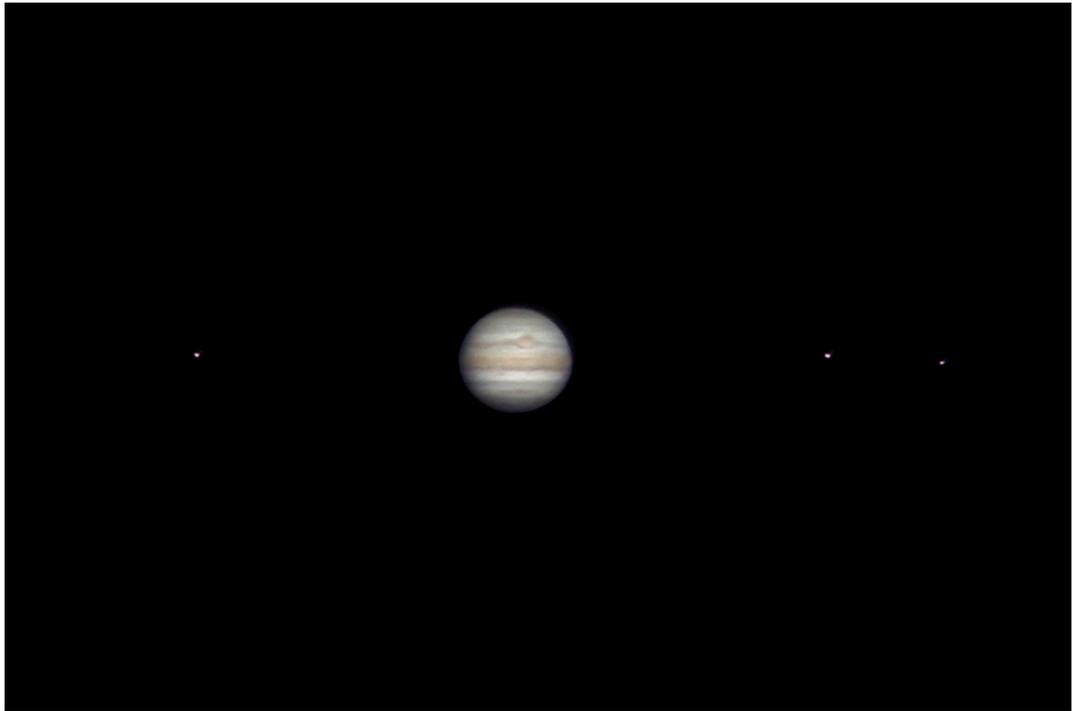


Deneb 28 X 1min135mm F4, Clubs new Startracker



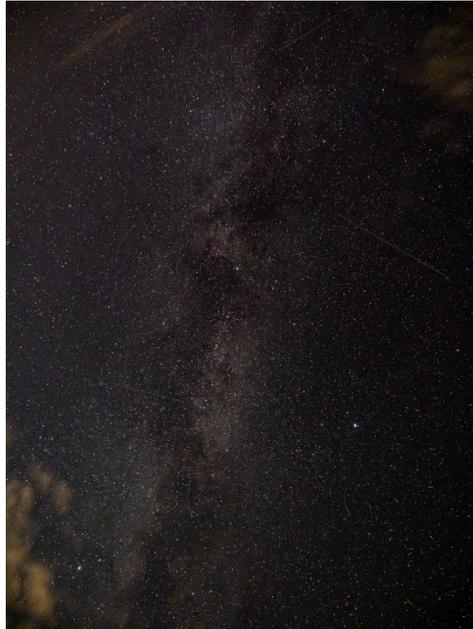
Perseid 2230UT

Roger Hyman



Jupiter, 3 moons (L to R) Europa, Io and Callisto and Great Red Spot.
1st August 2021. Taken on the C11 and ASI462 and ZWO ADC. 2000
frames processed in Autostakkert (best 30%), Registax and Photoshop.

Mick Ladner



Single frame of 20 sec @ f2.8 iso 1600. It was taken using the 12-40 f2.8 pro at 12mm (24mm full frame equivalent). Just a small amount of post processing in LR.



North American Nebula 20 x 180 second subs plus darks and flats.



The Crescent Nebula 20 x 180 second subs plus darks and flats



Added another 22x180 sec subs to the original 20x180 sec subs.

Pete Williamson



Messier 31 - The Andromeda Galaxy Distance : 2.5 Million Light Years

Telescope : 106mm f5 Takahashi Total Integration Time 90 Minutes



NGC 7331 The Pegasus Galaxy using both The Faulkes 2m (78") f10 on Haleakala Hawaii and The Liverpool 2m (78") f10 on La Palma. I obtained 15 mins of data from Haleakala Hawaii and 15 mins from La Palma on my observing runs. Total integration time 30 mins from 2 sites.



Pete Williamson FRAf ©DoPLA

Helix Nebula - NGC 7293 Telescope: 11" RASA f2.2

Total Exposure time: 30 Mins

Keith Morris



Canon EOS 700D 1/30 of a sec at f5.6 using a 75-300mm zoom lens at 300mm with x2 teleconverter (so 600mm focal length)

David Bryant



The Ophiuchus nova

Andrew Luck



Tulip nebula, Cygnus RGB data 2 hours red, 1 each for green and blue.



2 hours of Ha data of the area around the Tulip nebula in Cygnus.

Neil Wilson



Skywatcher MN-190 Mak Newt and Altair Hypercam 26C.
25 frames Stacked in AutoStakkert 3 and Tweaked with Photoshop.

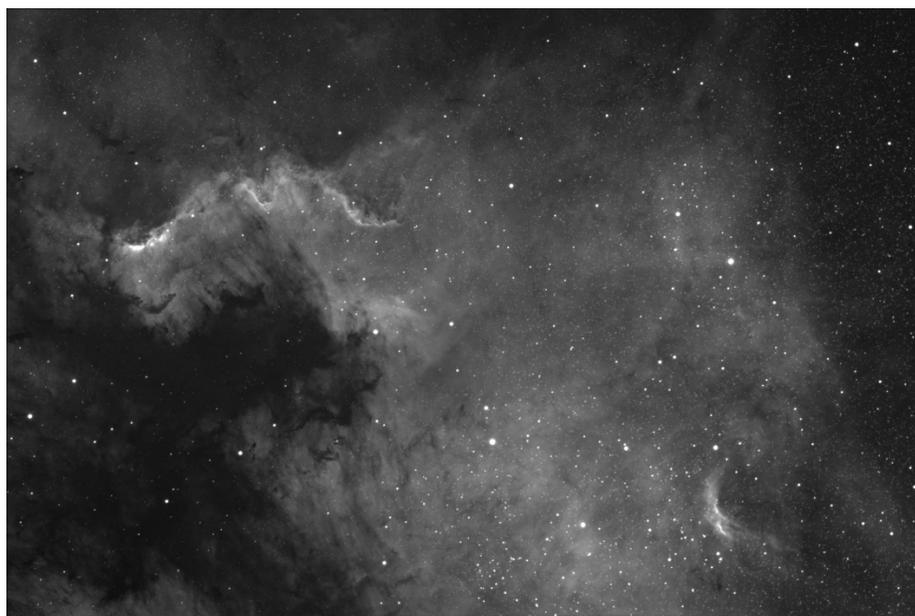


Skywatcher MN-190 Mak Newt and Altair Hypercam 26C.
54 x 30 sec light frames and 10 x 30 sec dark frames Stacked in DSS
and processed with Photoshop.

Malcolm James Dent



50 frames here in a 40 seconds of AVI.



12x 5 minutes of 6nm Ha from the Optolong filter

Invitation to Gresham Lectures

Dear Local Astronomy Society

I thought you and your members might be interested in these free public astronomy lectures held online by Professor Katherine Blundell and Professor Roberto Trotta in 2021-2.

We also have a one-off lecture by Professor Andrew Coates on Mars Missions 2021 - Early Discoveries, on Mon 20 Sep 1pm-2pm <https://www.gresham.ac.uk/lectures-and-events/mars-2021>

With very best wishes

Lucia Graves

ASTRONOMY

Cosmic Revolutions by Professor Katherine Blundell

[gres.hm/cosmic-revolutions](https://www.gresham.ac.uk/lectures-and-events/cosmic-revolutions)

This series will expound in context and in detail some key realisations about cosmic history that are now regarded as fundamental in the modern understanding of how the cosmos came to be, and of our place in it.

Early Universe

Wednesday, September 29, 2021 6:00 PM [gres.hm/early-universe](https://www.gresham.ac.uk/lectures-and-events/early-universe)

Museum of London/Online or watch later

This lecture will examine the evidence for and the significance of events that unfolded in the early Universe. "Early" here refers to within the first few seconds after the Hot Big Bang. These very early developments give rise to fundamental characteristics of the nature of the Universe.

Atomic Universe

Wednesday, November 3, 2021 6:00 PM [gres.hm/atomic-universe](https://www.gresham.ac.uk/lectures-and-events/atomic-universe)

Museum of London/Online Or watch later

Subsequent to the Hot Big Bang, as the Universe expanded and cooled, atoms formed and, later still, decoupled from radiation. This lecture will cover the intellectual revolutions in relatively recent history that paved the way to our modern understanding of the formation, existence and interactions of atoms.

Structures in the Universe

Wednesday, January 19, 2022 6:00 PM [gres.hm/structures-universe](https://www.gresham.ac.uk/lectures-and-events/structures-universe)

Museum of London/ Online Or watch later

How did the cosmos transition into space characterised by galaxies in a plethora of different shapes of great beauty? This lecture will consider what happens when groups of galaxies interact with one another and what happens when these galaxies collide and merge.

Magnetic Universe

Wednesday, February 23, 2022 6:00 PM [gres.hm/magnetic-universe](https://www.gres.hm/magnetic-universe)

Museum of London / Online Or watch later

Magnetic fields have mysterious effects that can be dramatically counterintuitive, and they are ubiquitous throughout the Universe and can have influence on large scales. This lecture will explore how some of the exotic and energetic phenomena in the Universe can only be explained in terms of these magnetic fields that pervade space.

Planetary Universe

Wednesday, March 30, 2022 6:00 PM [gres.hm/planetary-universe](https://www.gres.hm/planetary-universe)

Museum of London / Online Or watch later

How can new worlds be discovered, and how many exo-planets might be out there? What does today's technology in astronomical observatories now enable, and what is it that holds us back from finding what is actually out there? What hinders us from pushing forwards the frontiers of space science?

Life in the Universe

Wednesday, June 1, 2022 6:00 PM [gres.hm/life-universe](https://www.gres.hm/life-universe)

Museum of London / Online Or watch later

How can life form in the Universe, and what are the necessary ingredients for habitability so that planets can sustain life? Can we expect life elsewhere in the solar system, or on exo-planets? This lecture offers a broader perspective from astrobiology, astrochemistry, and astrophysics on the habitability or otherwise of other planets beyond Planet Earth.

The Frontiers of Knowledge by Professor Roberto Trotta [gres.hm/frontiers](https://www.gres.hm/frontiers)

We have progressed far in our understanding of the Universe, and yet so much is still tantalisingly unknown. What explains the accelerating expansion of the Universe? Can physics mend the broken Cosmic Distance Ladder? What is the future for life on our planet?

Einstein's Blunder

Monday, November 15, 2021 1:00 PM [gres.hm/einsteins-blunder](https://www.gres.hm/einsteins-blunder)

Barnard's Inn Hall/ Online Or watch later

When Albert Einstein tweaked his newly invented equations of General Relativity in 1917, he had one goal in mind: to find a solution that described a closed, static, eternal universe. He therefore minted a new universal constant to make it work. After Hubble's discovery of the expansion of the universe in

1929, Einstein reportedly declared it his "greatest blunder". In 1998 observations of distant exploding stars brought Einstein's "blunder" back into consideration: Einstein might have been right the first time around.

The Broken Cosmic Distance Ladder

Monday, January 31, 2022 1:00 PM gres.hm/cosmic-distance

Barnard's Inn Hall/ Online Or watch later

Measuring distances to astronomical objects outside our Galaxy is a surprisingly hard challenge: it wasn't until 1929 that Edwin Hubble obtained proof that Andromeda is indeed a galaxy in its own right. Today, astronomers extend distance measurements in the cosmos to the edge of the visible Universe, building up a 'cosmic distance ladder' made of several rungs. This talk will explore a major conundrum of contemporary astronomy: as observations have become more precise, the distance ladder appears today to be broken.

The Future of Life on Earth

Monday, May 9, 2022 1:00 PM gres.hm/future-life

Barnard's Inn Hall/ Online Or watch later

Although life is probably widespread in the universe, our pale blue dot, Earth, is the only known place harbouring intelligent life. Even if we manage to stave off extinction by climate change, avoid a nuclear apocalypse and the dangers of runaway AI, biological life on our planet will eventually come to an end in about 5 billion years' time. What are the astrophysical dangers to life on Earth, and the prospects for life's survival into the distant future?



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

chairman@brecklandastro.org.uk

OBSERVATORY RISK ASSESSMENT 2021

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.

	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 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 INTO employee leading the visit. This visit is arranged in advance and INTO duty staff should be aware of the students' location. Students should have INTO's number. The organisation that runs the observatory, Breckland Astronomical Society, operates a child protection policy. The committee are vigilant with regard to risks.	Low

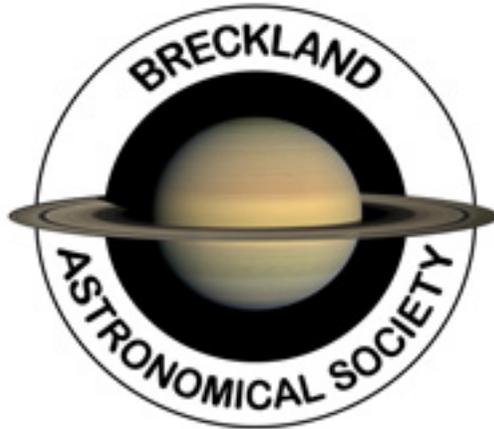
SARS CoVID19: Airborne Transmission indoors	Ventilate. Open shutter and doors. Wear Masks as long as Covid is at large in the population, unless exempt. Physically Distance 1m+. Limit numbers to what national guidelines state at the time. Given limited space not many are allowed in at a time. Provide outdoor activities, e.g. electronically assisted astronomy	Tolerable – as we have very good ventilation.
Outdoor transmission	Physically distance, however risk is found to be low outdoors. Follow national guidelines. Be mindful of face to face breath transmission.	Tolerable
Surface transmission	Sanitise hands on entry. Wipe surfaces. Use fresh eyepieces for each household. Limit one to use of kitchen/bathroom area. Only use disposable drinks containers and paper towels.	Low
Reporting	Sign in for track and trace purposes.	N/A

Trustees as of 16/05/2021 are: Dr Dan Self ** (Chairman), Andy Jones** (Treasurer), Richard Harmon. Committee members (acting trustees): Rebecca Greef*, John Copsey. 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.



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RETURN TO HALL COVID RISK ASSESSMENT 2021

The risk COVID poses to local residents is now much smaller, with up to a 1 in 1000 or less who catch COVID dying (source Tim Spector, ZOE). This is still an intolerable level of risk, however is not greater than a winter flu. As more are vaccinated and the longer we wait for the vaccines to take effect, and booster shots are given, this risk will reduce. If anyone is particularly vulnerable, eg has a respiratory disease, or a serious autoimmune disorder they may wish to continue to not attend in person. This would mean the risk of dying if the disease is caught reducing to a more Tolerable level. We will endeavour to livestream the talks from a tripod near the projection stand, although the service will not be as personal as zoom or google meet.

Hazards	Risk Control Measures	Outcome risk rating
Spread of SARS COVID-19 delta variant by airborne transmission	Limit numbers in hall to 40, it is a community building. Legally any number is allowed from July 19. Usually numbers are well below this, so will be a small risk.	Tolerable if we can keep doors open
	Physical distancing between bubbles, of 1 metre + not face to face. This is not enforceable, as it is not government guidelines. Space out chairs to fill room.	Chairs are all facing forward anyway so this works
	Do not come to the hall if displaying two or more COVID19 delta variant symptoms. These are (for vaccinated people, most common first): Headache, Runny Nose, Sore Throat, Sneezing, Persistent Cough or Loss of Smell. Fever (high temperature) is more likely to be a sign of COVID if unvaccinated.	
	Wear masks as a request. Again this is not enforceable as it is not government guidelines.	
	Ventilate hall. Easy when weather is warm, not ideal when cooler, so only applicable in August/September. The back door and bar flap may be a better option to use as a ventilation path in colder months.	
	Have a ventilation break at half time, open up all doors fully and have coffee then, in order to clear the hall from any possible airborne particulates (see below).	
Spread of SARS COVID-19 delta variant by airborne transmission during coffee	Masks have to be removed for coffee or a break for air. Or for those with breathing problems. Having coffee partly outside, we may not all fit, but any reduction in people density in the hall is a recommendation. This can be under a Gazebo erected by the fire doors, if weather is poor.	Tolerable if warm enough. Revise if case numbers climb, or weather worsens.
Spread of COVID-19 by Surface transmission	Sanitise hands on entry. Wipe surfaces. Washing hands a necessity after toilet use. Surface transmission is a minimal cause of COVID spread however, so it is considered low risk to use provided mugs again. However we must wash up	Low

	mugs thoroughly.	
	<p>Payment is still cash only (£2.50). The other method is by donating £2.80 to the Donate button at the website (add 30p for the PayPal costs). Raffle ticket prices to be added.</p> <p>Surface transmission via coins and paper is a minimal cause of COVID spread.</p>	Low
Outdoor transmission	<p>Physically distance more than normal, however risk is found to be low outdoors. Follow national guidelines. Be mindful of face to face breath transmission. Note: if you can see where someone's vape is going you can catch airborne particles from their lungs. Note 2: Please keep vaping outside the hall.</p>	Tolerable
Reporting	<p>Signing in for track and trace purposes will be stopped from July 19. However records of numbers will be kept by the entry log book.</p>	Not necessary

Trustees as of 16/05/2021 are: Dr Dan Self ** (Chairman), Andy Jones** (Treasurer), Richard Harmon. Committee members (acting trustees): Rebecca Greef*, John Copsey.

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.

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 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 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 – Winter 2021

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

Back in the hall £2 u18s £1 Livestream £free details to follow

Friday, September 10 th	Planetary Imaging Techniques	Dr David Arditti, BAA
Friday, September 24 th	Public Open Night	Observatory
Friday, October 9 th	Archaeoastronomy – A Brief History	Professor Clive Ruggles (Leics. Alum)
Friday, October 29 th	Public Open Night	Observatory
Saturday November 6 th	Star Party (main night)*	Haw Wood Farm
Friday, November 12 th	Quiz Night (Telescope raffle)	Chairman BAS
Friday, November 26 th	Public Open Night	Observatory
Friday, December 10 th	“Star Life”	Michael Poxon and Shaun Reynolds
Thursday, December 30 th	Public Open Night (TBC)	Observatory
Friday, January 14 th	TBA	
Friday, January 28 th	Public Open Night	Observatory
Friday, February 11 th	Adventures in the Zooniverse	Professor Chris Lintott
Friday, February 25 th	Public Open Night	Observatory
<p>* Haw Wood Farm Caravan Park, Hinton, Saxmundham, IP17 3QT. www.hawwoodfarm.co.uk to book: info@hawwoodfarm.co.uk 01502 359550. £12 per pitch per night subject to updates</p>		