



OASI News

The newsletter of the Orwell Astronomical Society



The Horsehead and Flame Nebulae

Photo by Stephen Solley

Trustees:

Mr Roy Adams

Mr Neil Morley

Mr David Payne

Honorary President:

Dr Allan Chapman D.Phil MA FRAS

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Society Notices

Dear Members,

We use a Zoom Pro account for online meetings. If you would like to join in, please email Paul Whiting, treasurer@oasi.org.uk

In the coming months, we will be guided by advice from the Government and Public Health England, as to when we can resume some of our activities. These are likely to be very limited at first, the Committee will decide what could be done, with the health and safety of everybody being the highest priority.

I would like to wish everybody clear skies, stay safe and I hope to see you soon.

Andy Gibbs, Chairman

Society Contact details

Email queries: info@oasi.org.uk

Facebook: Orwell Astronomical

Twitter: @OASIPswich

YouTube:
<https://www.youtube.com/channel/UCHgxe3QAeRVWf7vkjKkCI2Q>

Members-only message board

<https://groups.io/g/OASI>

Observatory (meeting nights only)
07960 083714

**Please send material for the OASI
web site and newsletter
e.g. observations, notices of events,
general interest articles, to
news@oasi.org.uk**

The CLOSING date is the 15th day of the month

Access into the School Grounds and Observatory Tower

Please use the third gate into the school grounds by the gym.

Areas out of Bounds

Access to the Observatory is only via the black door at the foot of the Observatory tower, which leads to the staircase and thence to the spiral staircase up to the Observatory. If the black door is locked, please phone the observatory mobile during meeting hours. Kindly check/amend the number shown on your 2021 membership card.

Please do NOT explore other routes. When in doubt, ask or call the Observatory mobile.

Remember this is a school and straying into the main part of the school where the pupils reside would cause the society big problems and could see us losing the use of the observatory. Any member found to be anywhere other than the approved access route or the observatory area will face serious sanctions up to and including expulsion from OASI.

Please note that access time for all observatory member nights is after 20:15

Articles for OASI News

News, pictures and articles for this newsletter are always welcome. Details above.

Please submit your articles in any of the following formats:-

Text: txt, rtf, rtf, doc, docx, odt, Pages, pdf

Spreadsheets: xls, xlsx, OpenOffice/LibreOffice, Numbers

Images: tiff, png, jpg

Please send tables as separate files in one of the above formats.

If you don't feel up to writing a major article, perhaps you might write a short note for OASI News along the lines of "This month I have mostly been observing/constructing/mending/reading/etc."?

Newsletter archive www.oasi.org.uk/NL/NL_form.shtml

Authors, please note that your articles will be publicly available worldwide!

Reproducing articles from OASI News

If you plan to reproduce an article exactly as per OASI News then please contact the Editor – otherwise, as a matter of courtesy, please seek permission from and credit the original source/author. You may not reproduce articles for profit or other commercial purpose.

Committee 2022

Chairman	Andy Gibbs	Set overall agenda for OASI, Chair committee meetings, Press and publicity,
Secretary	Roy Gooding	Outreach meetings (jointly with Chairman), observatory decoration.
Treasurer	Paul Whiting FRAS	Finance, Supervision of applications for grants. Visits by outside groups, Observatory tours, Public appreciation of astronomy, Outreach activities.
Committee	James Appleton	Committee meeting minutes, Web site
	Martin Cook	Membership, Tomline refractor maintenance & user testing
	Matt Leeks	Safety & security
	Peter Richards	Lecture meetings, Email distribution lists
	John Wainwright	Equipment curator
	Mike Whybray	Astronomy Workshops, Child protection officer, Orwell Park School Astronomy Club.
	Andy Wilshere	Librarian
	Avtar Nagra	OASI @ Newbourne
Assistants	Martin Richmond-Hardy	Newsletter, OASI @ Newbourne

Committee Meeting

The next Committee Meeting will be on Friday 18 February at 8:00pm via Zoom.

OASI and BAA Events

Please note that the listed events may change depending on the progress of the pandemic. For the latest event details, please see www.oasi.org.uk/Events/Events.php

There's a Google Calendar on the OASI web site with the latest dates (and corrections!). If you want to easily add OASI Events to your own computer/phone/tablet calendar application click this button on the website Events page (bottom right of the calendar) or use this address to access this calendar from other calendar applications.



<https://calendar.google.com/calendar/ical/1jhs9db71ncki4sojo7092vfc%40group.calendar.google.com/public/basic.ics>

For other astronomy news and astro pictures try our

Twitter feed <https://twitter.com/OASlpswich>

Facebook page <https://www.facebook.com/pages/Orwell-Astronomical/158256464287623>

Date, Time & Location	Contact	Event
Weekly, every Wednesday, from 20:15	Martin Cook, Roy Gooding	Ob.servatory open except 8 Dec Meet via Zoom.
2022		
Friday 28th January 8pm	Pete Richards lectures@oasi.org.uk	Dame Jocelyn Bell Burnell will deliver a talk to OASI live on Zoom. “Bursts, bangs and things that go bump in the night – transient astronomy.”
Friday 11 February	Paul Whiting treasurer@oasi.org.uk	Zoom Talk (Recorded) Prof Emily Levesque “The Last Stargazers - the changing nature of professional stargazing”
Monday 14 February	Martin R-H newbourne@oasi.org.uk	OASI @ Newbourne
Thursday 17 February	Paul Whiting treasurer@oasi.org.uk	OASI on Zoom
Friday 18 February 8pm	Roy Gooding	Committee meeting via Zoom
Monday 28 February	Martin R-H newbourne@oasi.org.uk	OASI @ Newbourne Sky Notes by Bill Barton FRAS

Date, Time & Location	Contact	Event
Friday 11th March	Paul Whiting treasurer@oasi.org.uk	Zoom Talk (Recorded) Prof Anna Scaife "Jodrell Bank, the Cold War & the Space Race"
Thursday 17 March	Paul Whiting treasurer@oasi.org.uk	OASI on Zoom
Friday 15 April	Paul Whiting treasurer@oasi.org.uk	Zoom Talk (Recorded) with Dr Katie Mac "The End of Everything (Astrophysically Speaking)"
Thursday 21 April	Paul Whiting treasurer@oasi.org.uk	OASI on Zoom

Meetings via Zoom

Paul Whiting has set up an OASI account on Zoom Pro which allows us to accommodate more participants.. To join, please first contact Paul, treasurer@oasi.org.uk – OASI members only. Be sure to install/update to the latest version of Zoom – there's no need to set up an account. Go to <https://zoom.us/join> and enter the meeting ID or personal link name. You will have received a link from the meeting organiser.

OASI @ Newbourne

Martin Richmond-Hardy newbourne@oasi.org.uk

We meet at Newbourne Village Hall, Mill Lane, IP12 4NP on the 2nd and 4th Mondays from 19:30.

In view of the ongoing Covid situation, we kindly request that attenders wear masks in the village hall to protect others and themselves. Hand gel is available.

Newbourne dates for 2022

January	3	24 (A)
February	14	28 (A)
March	14	28 (A)
April	11	25 (A)
May	9	23 (A)
June	13	27 (A)
July	11	25 (A)
August	8	22 (A)
September	12	26 (A)
October	10	24 (A)
November	14	28 (A)
December	12	26 (may omit as it's Boxing Day)

We open up for all meetings at 7:30pm. Astro News/Star Guide (A) at 7:45pm followed by any Talks (T), Workshops (W) and the occasional Quiz (Q).

Stargazer's Guide

On the last meeting each month, at 19:45, Bill Barton FRAS will give a short presentation of what can be viewed in the following 4 weeks plus a reminder of OASI events. These will be available on our website.

Astronomy Workshops/Informal talks

Meetings will depend on COVID-19 situation.

Contact Mike Whybray Monday meetings start at 7:30pm. Workshops / Talks start at 8pm

If you are a new OASI member, or haven't been to one of these informal workshops before, they are a mixture of events of different characters including beginners talks, interactive workshops, films, etc., suitable for all.

Do you have a subject you could workshop/talk? You could do a short one, or share the effort with a partner. Drop Mike Whybray a line! workshops@oasi.org.uk

Lectures – via Zoom

Contact: Peter Richards lectures@oasi.org.uk

The start time for all talks will be 8pm and, as usual, the talks will usually be held on a Friday evening.

All meetings are currently via Zoom. Contact Paul Whiting if you can't find the details.

Friday 28th January 2022 20:00

Dame Jocelyn Bell Burnell will deliver a talk to OASI live on Zoom. The talk title will be confirmed at a later date. Other local astronomy society meetings

Athaneum Astro Society

www.3a.org.uk/index.htm

Meetings suspended during the Covid-19 situation.

LYRA Lowestoft & Yarmouth Regional Astronomers

www.lyra-astro.co.uk

Due to current Corona Virus outbreak all LYRA meetings are cancelled until further notice.

DASH Astro

Darsham And Surrounding Hamlets <http://dash-astro.co.uk>

Meetings are normally held at New Darsham Village Hall and all DASH Astro observing sessions will take place at Westleton Common. ASOG observing sessions and locations may be arranged at the time of observation. Unless stated all group meetings will take place from 7:30 pm. on Sundays.

Meetings will be assessed in line with the current Government Guidelines in place at the time.

BAA news & webinars

For full details of all meetings or cancellations, please go to <https://britastro.org/meetings/2022>.

2022

Wednesday, 2022, March 30 – 17:30	Special General Meeting and Ordinary Meeting
Friday, 2022, April 8 – 19:00	The 2022 Winchester weekend at Sparsholt College, Winchester
Saturday, 2022, April 23 (All day)	BAA Spring Meeting, Leeds
Wednesday, 2022, May 25 – 17:30	BAA Special General Meeting, Ordinary Meeting & George Alcock Memorial Lecture

The BAA Radio Astronomy Section

Thanks to an initiative by Paul Hearn, the BAA Radio Astronomy Section have been enjoying talks, seminars and tutorials via Zoom.

These are/will be available on the BAA YouTube channel.

<https://www.youtube.com/user/britishastronomical/playlists>

From the Interweb

<https://chandra.si.edu/photo/2022/mrk462/> Astronomers have discovered the presence of a growing super-massive [#BlackHole](#) in dwarf galaxy Mrk 462. This discovery could help scientists unravel the mystery around how some of the earliest black holes in the Universe formed and grew.

<https://eandt.theiet.org/content/articles/2022/01/anglo-australian-telescope-uncovers-dark-matter-mysteries-in-the-milky-way/>

Astronomers believe they are one step closer to revealing the properties of dark matter enveloping our Milky Way galaxy. A team from the University of Toronto has developed a map of 12 streams of stars orbiting within our galactic halo that may reveal the way in which dark matter holds the stars in their orbits, while also giving clues about the formation history of the Milky Way.

<https://www.rit.edu/news/rit-scientists-confirm-highly-eccentric-black-hole-merger-first-time>

For the first time, scientists believe they have detected a merger of two black holes with eccentric orbits. According to a paper published in Nature Astronomy by researchers from Rochester Institute of Technology's Center for Computational Relativity and Gravitation and the University of Florida, this can help explain how some of the black hole mergers detected by LIGO Scientific Collaboration and the Virgo Collaboration are much heavier than previously thought possible.

<https://www.youtube.com/watch?v=YiHDRFk3OzM> OPS Observatory 1971.

<https://www.gov.uk/government/news/rosalind-franklin-mars-rover-passes-latest-tests-ahead-of-september-launch>

Rosalind Franklin Mars rover passes latest tests ahead of September launch. The UK-built ExoMars Rosalind Franklin rover is set for launch in September after a series of successful tests, including driving off its landing platform.

WANTED – Deputy Editor

This is for the second time of asking

In the event of a stray bus, hospitalisation or just holidays, it would be helpful to have someone to act as Editor in my absence.

You may use whatever word processor or DTP system with which you are comfortable. The only proviso is that it can produce a pdf file. Enquiries and offers to Martin via news@oasi.org.uk or speak to me at Newbourne.

Thank you in anticipation.

Martin Richmond-Hardy

The Night Sky in February 2022

Martin RH

All event times (UTC) are for the location of Orwell Park Observatory 52.0096°N, 1.2305°E.

Sun, Moon and planets

Sources:

<http://heavens-above.com/PlanetSummary.asp> <http://heavens-above.com/moon.aspx>

Object	Date	Rise	Set	Mag.	Notes
Sun	Feb 1	07:35	16:43		
	Feb 28	06:43	17:33		
Moon	Feb 1	08:22	16:49		New 01 February 05:46 First Q 08 February 13:50 Apogee 11 February 02:38
	Feb 28	06:20	14:19		Full 16 February 16:57 Last Q 23 February 22:33 Perigee 26 February 22:26
Mercury	Feb 1	06:32	15:12	1.3	Max. western elongation Feb-16
	Feb 28	06:11	15:02	0	Aphelion Feb-28
Venus	Feb 1	05:23	14:25	-4.5	
	Feb 28	04:38	13:34	-4.4	
Mars	Feb 1	05:50	13:15	1.4	
	Feb 28	05:16	13:08	1.3	
Jupiter	Feb 1	08:37	18:53	-1.9	
	Feb 28	07:01	17:43	-1.9	
Saturn	Feb 1	07:53	16:47	0.7	Superior conjunction Feb-04
	Feb 28	06:14	15:19	0.8	
Uranus	Feb 1	10:24	01:01	5.8	
	Feb 28	08:39	23:15	5.8	
Neptune	Feb 1	09:01	20:13	7.9	
	Feb 28	07:17	18:32	8	

Occultations during February 2022

https://iota-es.de/moon/grazing_descrx101.html and <http://www.lunar-occultations.com/iota/bstar/bstar.htm>

Observers are encouraged to download and install the [Occult](#) software program [Windows only] to generate predictions for their own particular site coordinates.

Meteor showers during February 2022

Source: BAA Handbook 2021 p26-27 and <https://in-the-sky.org/newsindex.php?feed=meteors>

Shower	Normal limits	Maximum	Max RA/Dec.°	ZHR at Max	Notes
Only sporadics					

For radio observation, use reflections from Graves radar on 143.050MHz or the Brams transmitter in Belgium on 49.97MHz. See also https://www.popastro.com/main_spa1/meteor/radio-meteor-observing-2020/

Visible ISS passes $\geq 15^\circ$ max altitude

Source: <http://heavens-above.com/PassSummary.aspx?satid=25544>

Times are BST. Predictions are approximate (23 July) due to craft adjustments. Check the day before.

Date	Bright-ness (mag)	Start			Highest point			End		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
01 Feb	-3.5	17:16:48	10°	W	17:20:07	70°	SSW	17:23:27	10°	ESE
01 Feb	-1.9	18:53:46	10°	W	18:56:34	25°	SSW	18:57:34	21°	S
02 Feb	-2.3	18:05:31	10°	W	18:08:35	34°	SSW	18:11:39	10°	SE
03 Feb	-2.7	17:17:20	10°	W	17:20:33	45°	SSW	17:23:45	10°	SE
03 Feb	-0.8	18:55:08	10°	WSW	18:56:42	13°	SW	18:58:15	10°	SSW
04 Feb	-1.1	18:06:23	10°	W	18:08:46	18°	SW	18:11:10	10°	S
19 Feb	-0.9	06:04:17	10°	S	06:06:26	16°	SE	06:08:34	10°	ESE
21 Feb	-2	06:03:13	10°	SSW	06:06:12	30°	SSE	06:09:11	10°	E
22 Feb	-1.6	05:15:31	11°	SSW	05:18:01	22°	SE	05:20:40	10°	E
23 Feb	-1.3	04:29:22	15°	SSE	04:29:51	15°	SE	04:31:54	10°	ESE
23 Feb	-3.1	06:02:48	10°	WSW	06:06:04	51°	SSE	06:09:21	10°	E
24 Feb	-2.7	05:16:01	21°	SSW	05:17:47	39°	SSE	05:20:57	10°	E
25 Feb	-2.2	04:29:40	29°	SE	04:29:40	29°	SE	04:32:29	10°	E
25 Feb	-3.6	06:02:39	10°	WSW	06:06:00	75°	S	06:09:22	10°	E
26 Feb	-3.5	05:16:08	29°	WSW	05:17:39	63°	SSE	05:20:59	10°	E
27 Feb	-3	04:29:38	47°	SE	04:29:38	47°	SE	04:32:34	10°	E
27 Feb	-3.7	06:02:35	10°	W	06:05:57	87°	S	06:09:19	10°	E
28 Feb	-1	03:43:05	18°	E	03:43:05	18°	E	03:44:07	10°	E
28 Feb	-3.8	05:15:59	29°	W	05:17:32	83°	S	05:20:55	10°	E

Starlink passes

<https://heavens-above.com/AllPassesFromLaunch.aspx>

For a dynamic 3-D display, see <https://heavens-above.com/StarLink.aspx>

Comets with magnitude brighter than magnitude 10

Source: <https://heavens-above.com/Comets.aspx> and BAA Handbook p95.

Comet	Brightness	Peak
C/2021 A1 Leonard	5.9	Jan 01
19P Borrelly	8.9	Jan 22
C/2019 L3 ATLAS	9.2	Jan 07
67P Churyumov-Gerasimenko	9.5	Jan 01
104P Kowal	9.7	Jan 15

Comets peaking in February are dimmer than magnitude 15

Astronomy on the radio

Bill Barton's Radio Broadcast

ICRFM (Ipswich Community Radio) 105.7 MHz at about 08:25 in the morning of the first Wednesday of each month. I aim to cover what there is to see in the sky and then a little bit on something topical. ICRFM is also available to listen to over the Internet and there is a listen again option on their website. <http://www.icrfm.com>

David Murton's Radio Broadcast

On 1st Tuesday of the month, 2.40pm on the Lesley Dolphin show on BBC Radio Suffolk and the internet. <https://www.bbc.co.uk/radiosuffolk>

All-Sky camera reports

Alan Smith

Editor's Note: As it is not possible to include video clips, I have replaced with stills where available.

The first week of the new year has seen 2 nice fireballs captured by cameras operated by society members.

5/1/22 0453hrs UT, the allsky camera at Grundisburgh picked up the first event of the year. Well to the north it does not seem to feature on any of the video systems as a 'matched' event. The UKMON camera operated by Martin at Kirton did catch it however, as did the north facing video camera operated by a friend in Ipswich (the grainy colour video with the event just caught bottom right). Cloud over western Europe meant that none of the Dutch Meteor Society (DMS) cameras caught it.

Attached are the allsky image from Grundisburgh and Kirton. Videos from Kirton & Ipswich are available on the OASI website.

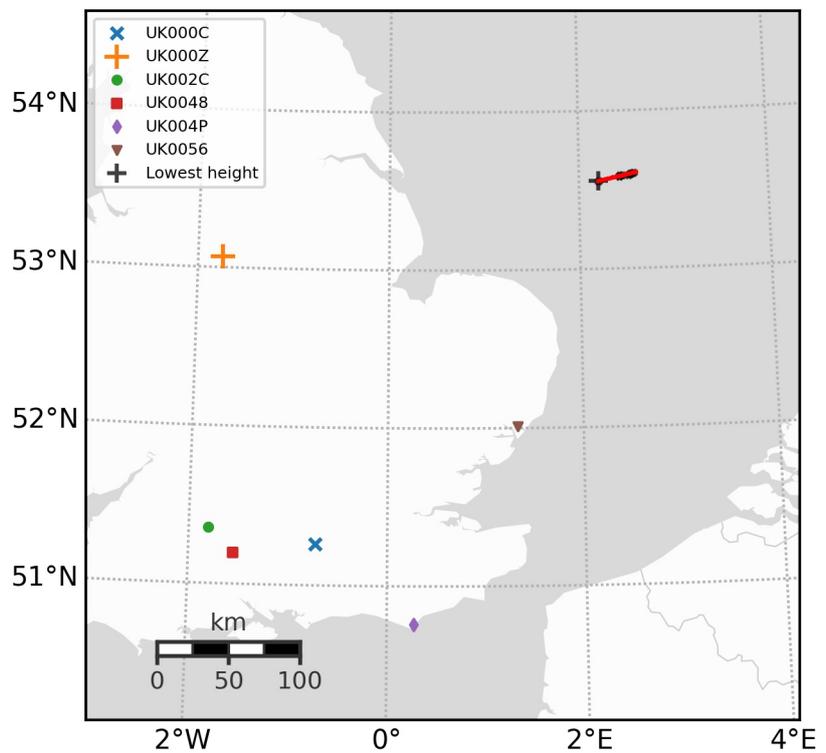


Grundisburgh image 5/1/22 0453hrs UT annotated



Kirton image (merged video frames) 5/1/22 0453hrs UT

The bright meteor spotted on 2022/01/0 at 045317 was seen by six stations and the track is shown on this map, calculated by UKMON.



The data here are released under the [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/) license,

https://archive.ukmeteornetwork.co.uk/reports/2022/orbits/202201/20220105/20220105_045317.855_UK/index.html

The 2nd event (0209hrs UT 6/1/22), was much brighter and was caught by a few people who observed it visually and both allsky cameras operated at Grundisburgh and Ipswich. It was also captured on video cameras running at Grundisburgh and by Martin Cook in Ipswich. Chris in Ipswich also caught the radio reflection from the BRAMS transmitter in Belgium.

At least one allsky camera operated by the DMS also got an image, as did another allsky operator near Royston (UK), and the DMS have managed to reduce the trajectory.

The object entered the atmosphere just off the French coast at a height of 95km and travelled towards Folkstone reaching a maximum brightness of magnitude -7.1 at a height of 57km. It finally entered its dark flight phase at 39.7km altitude travelling at 37km/sec around 25km south of Folkstone. It is unlikely to have reached the ground (or, in this case, the sea).

Although both James and I caught the event on our allsky cameras, we were both looking almost directly at the trajectory and so the triangulation angle was very unfavourable. The DMS camera at Ypres however was almost at right angles to the flight and so a good triangulation could be made by the DMS.

The allsky camera at Grundisburgh has a 'rotating shutter' which chops the track at 16 breaks per second, allowing the speed to be measured.

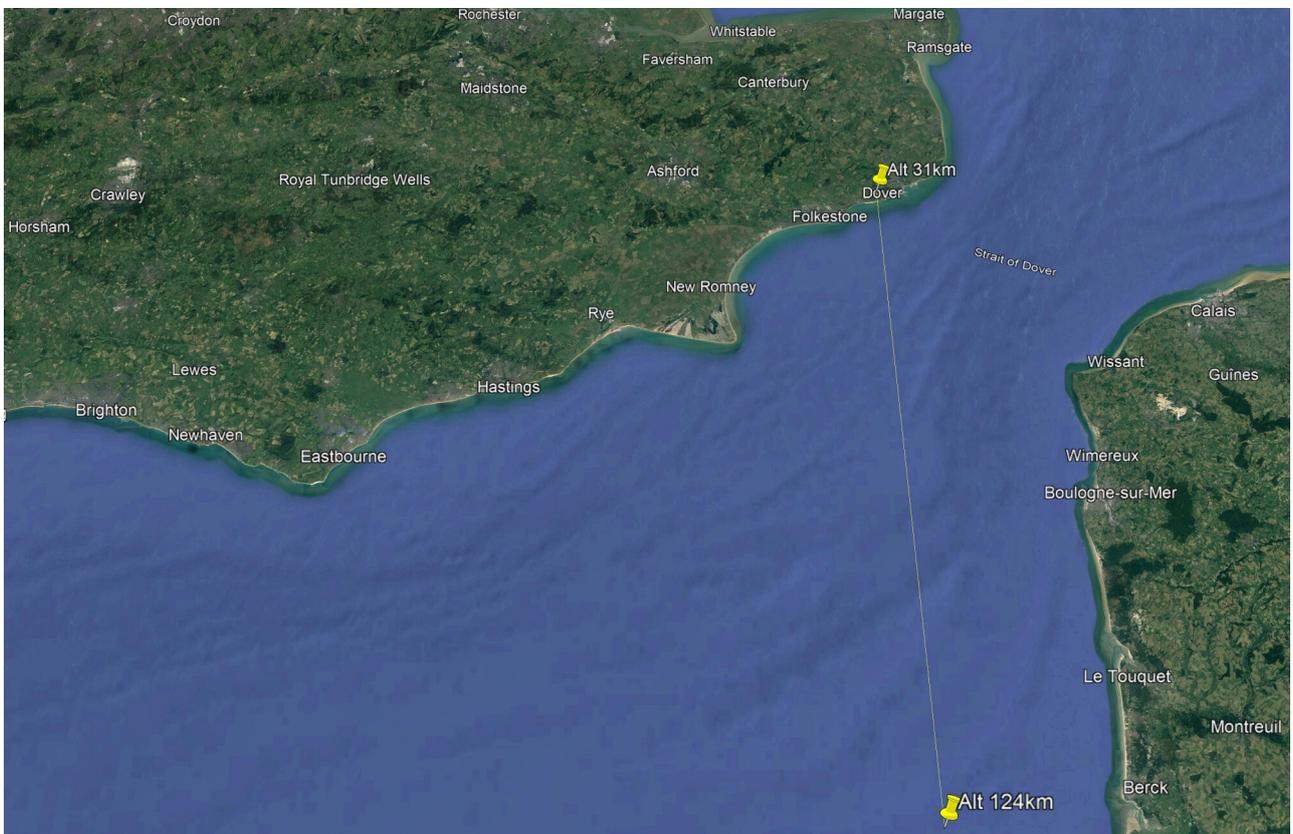
Attached are the allsky images from Grundisburgh and Ipswich, [the video from Martin Cook in Ipswich is on the website] and the ground track supplied by the DMS.



2022-01-06-020933_jma



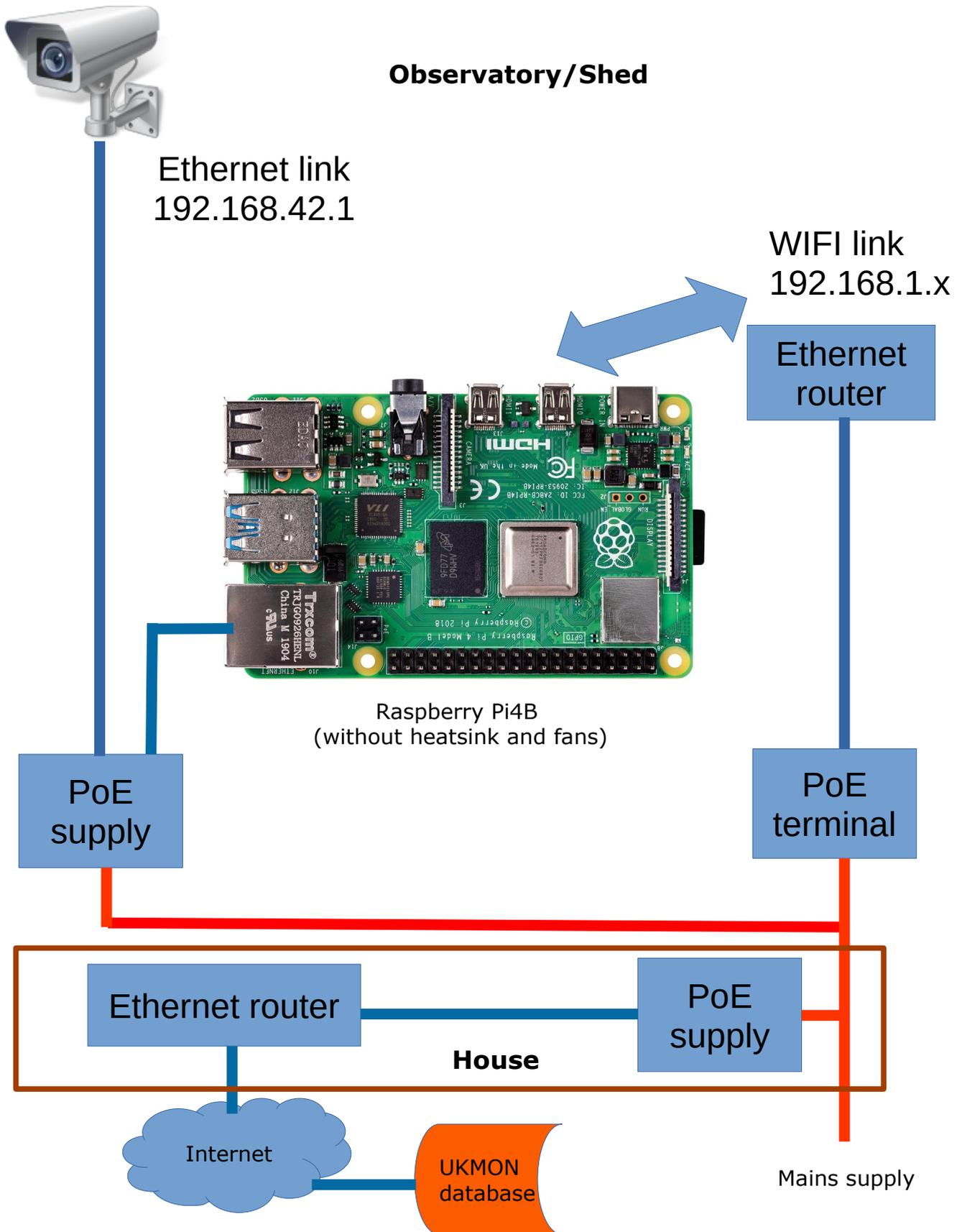
Grundisburgh image annotated 2022-01-06T02-08-37-585



2022-01-06 Track

The UK Meteor Observation system at Kirton UK0056

Martin Richmond-Hardy



The diagram shows the arrangement of camera, Raspberry Pi and the associated Ethernet connections.

The home computer can access the Raspberry Pi using RealVNC (comes as standard with the Pi OS) in order to update the Pi's operating system and associated software packages. There is also a web-based GUI (Graphical User Interface) which enables camera, location (determines dusk/dawn times) and some other parameters to be set and modified without the need to resort to the use of Terminal..

The cameras used by the UKMON are monochrome, fitted with a lens giving a 90° view.



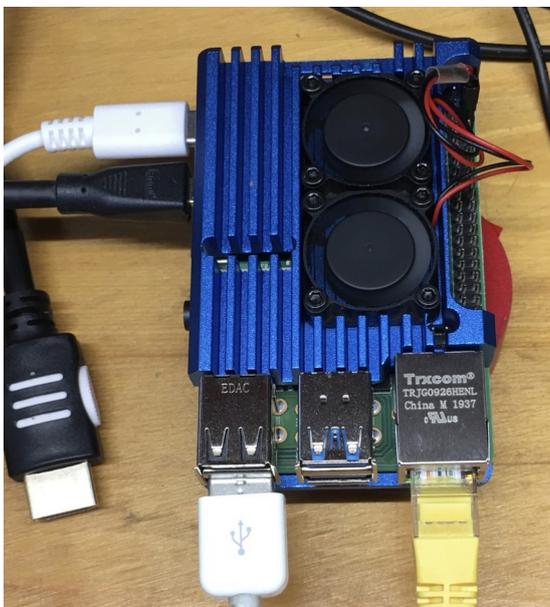
The UK0056 station at Kirton

The camera in its housing with PoE board attached

The waterproof camera housing contains the camera electronics plus a PoE board, enabling the camera to be supplied with a single Ethernet cable carrying power and signal.

The camera is mounted within the housing with a slight downward angle so that the external housing visor is not visible and, therefore, the actual elevation angle ($\sim 25^\circ$) is less than it appears in the picture.

The computer



Due to the amount of processing required by the RMS software, it is necessary to use a Raspberry Pi4B and fit it with a heatsink and fans.

The connections in the picture are power, HDMI link to the monitor, USB connection to the keyboard and mouse, Ethernet to the camera via the PoE wall-wart.

The Raspberry Pi4 has two IP addresses, one for the camera connected to the Ethernet port and one for the wifi connection to the wireless router (on a shelf above the Pi).

The router (used as an Ethernet switch) is then connected to the house network via a power-line Ethernet wall-wart.

How it works

The software in the Raspberry Pi is called RMS, which stands for Raspberry Pi Meteor System.

If you're new to RMS and want to find out more, start by reading [What is RMS?](#) Once you're ready to set up a system, UKMON can provide a prebuilt system for you.

The RMS system runs on a Raspberry Pi (4b preferred), and uses a low-cost security camera to continuously capture images of the night sky.

In real time, it analyses this data in chunks of 256 frames to look for movement that could be meteors, and keeps a log of potential events.

In the morning after data capture finishes, it re-checks the data, confirms probable meteors, and uploads the results to the GlobalMeteorNetwork servers for further detailed scientific analysis. Additionally, if you install the UKMON toolset, the data are uploaded to the UK Meteor Network's servers too.

If you're new to RMS, there are instructions on how to set up the software [here](#). It can also be provided on a pre-configured microSD card for the Pi.

The software is written in python. It is maintained by a team of professional meteor scientists from several universities as well as amateur enthusiasts and generates science-quality data used in real research projects. Many papers have now been published based on the data, and we've even discovered new meteor showers.

There is a great deal of information available on the UKMON wiki:

<https://github.com/markmac99/ukmon-pitools/wiki>

The RMS software installed on the Pi takes short videos between dusk and dawn. Thereafter it does processing on the images, uploads the data to UKMON, archives the images on the Pi and then updates the UKMON software and restarts ready for the next day.

In order for the Pi to do the processing of the images it needs the following information:

1. Location of the camera
2. Elevation angle and any rotation angle of the camera.
3. A mask to mask-out trees, bushes (which might also move in the wind) and other objects which are not part of the sky. This is a bmp file.
4. A platepar file to relate the distortions of the optics to the stars in the sky view and enables the software to

make a kml file which you can use to map the field of view onto Google Earth for meteor track HASLs of 25, 50 and 100km.

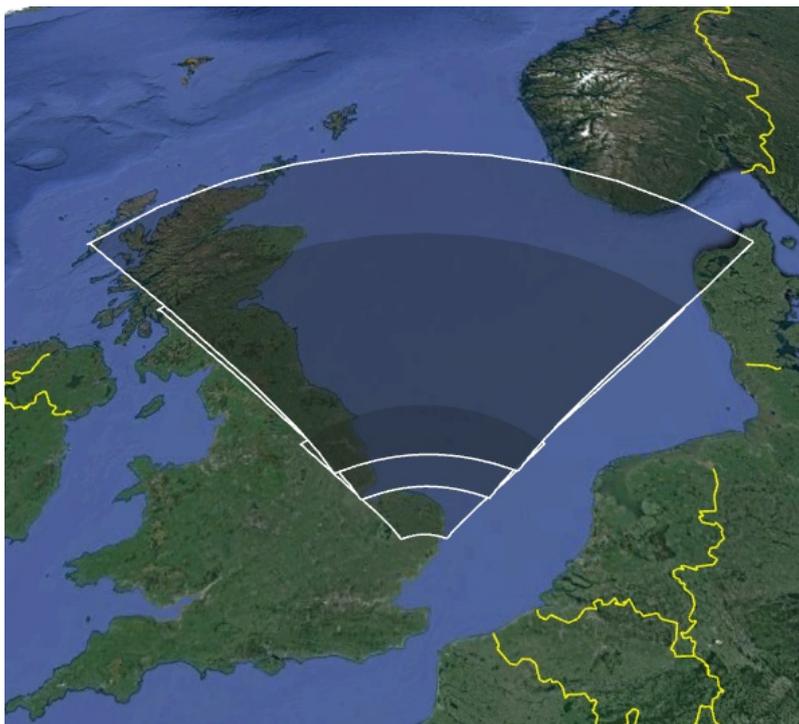
There is a description here of how to create a platepar file:

<https://github.com/markmac99/ukmon-pitools/wiki/How-to-create-a-Platepar-File>

but if you speak nicely to the UKMON team someone will construct one for you from the pictures already captured by your camera.

Software

If you buy a system from UKMON they will supply a preconfigured 128GB microSD card complete with the RaspberryPi OS and the RMS and associated software.



Camera location

You can attach the camera to your house, ideally not facing street lights or neighbours' security lights. In this case the Raspberry Pi will be in the house and you can avoid a long power-line ethernet system.

The results

The UKMON Reports are to be found here <https://archive.ukmeteornetwork.co.uk/reports/index.html> where you can select by Year, Trajectories & Orbits, Fireballs and Stations.

Here's the report for my station:

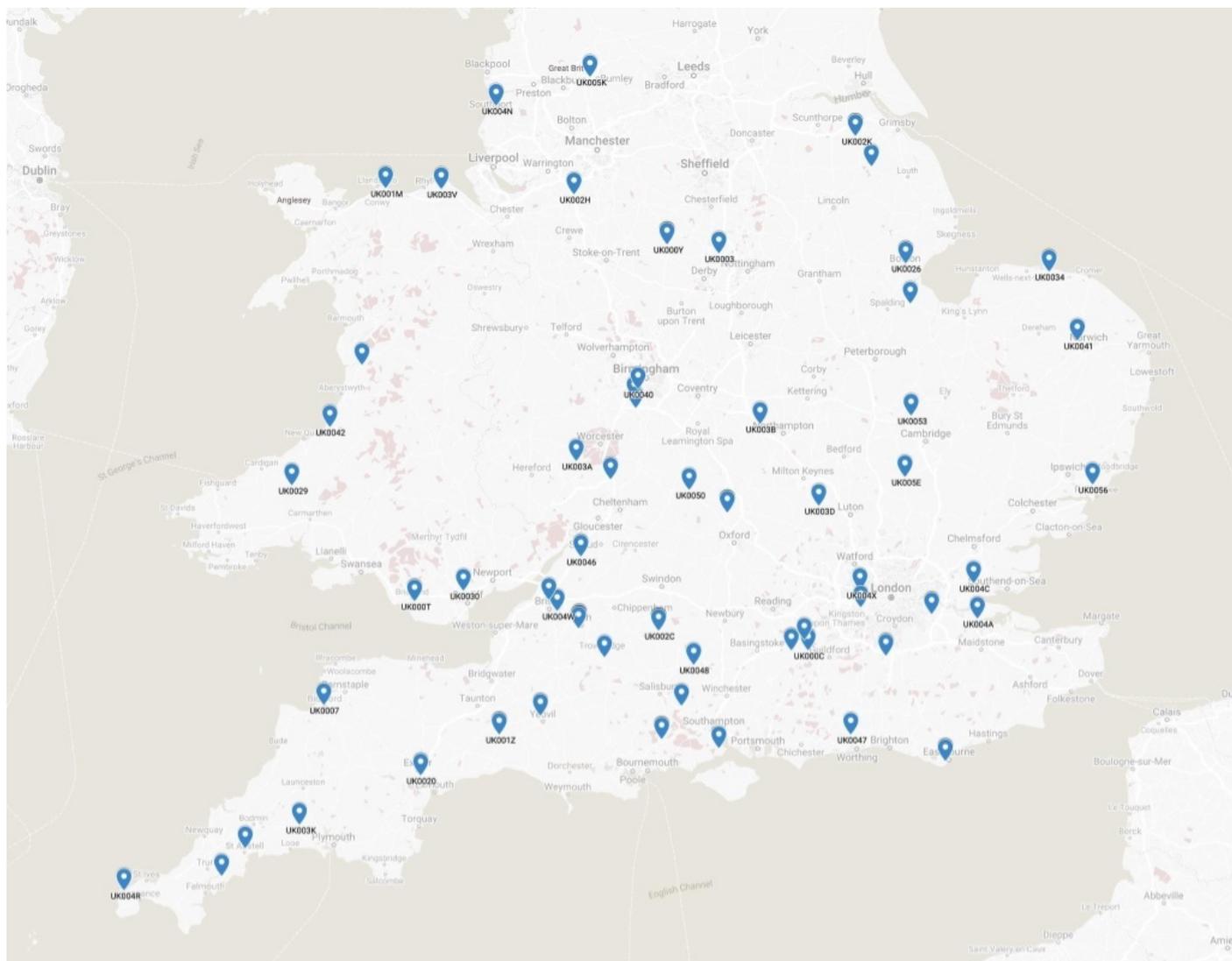
<https://archive.ukmeteornetwork.co.uk/reports/2022/stations/Kirton/index.html>

An example of the UKMON analysis is here

https://archive.ukmeteornetwork.co.uk/reports/2022/orbits/202201/20220109/20220109_002926.342_UK/index.html

The UKMON network

This is the current map of camera locations in southern UK There are more in Scotland and Ireland (North and Eire)



My own camera points north (the only direction not obscured by trees) so it could be useful to have other cameras in the east of England pointing to the other compass points.

If your Pi is located in a garden shed/observatory (as is mine) you can access it remotely (from the warmth of the house). I use Real VNC which comes with the Raspberry Pi OS. You need to install VNC Viewer on you house-based Mac/Windows/Linux/iOS/Android computer. It is available free from <https://www.realvnc.com/en/connect/download/viewer/> Other VNCs are available but the RaspberryPi cOS omes with a RealVNC server.

The output & reports

The full set of UKMON reports provide access to a summary report by year and by shower, and reports on the trajectories and orbits of matched events. <https://archive.ukmeteornetwork.co.uk/reports/index.html>

The Annual and Shower reports provide a summary of the number of meteors detected, their characteristics such as magnitude, velocity, direction of travel, and includes some statistics on the shower or whole year.

The Orbit reports provide detailed information about the trajectory and orbit of any events that were detected on two or more cameras, and for which this analysis was therefore possible. On the orbit report pages you will find images of the event, graphics showing the orbit and trajectory and other information.

The report for Kirton UK0056 is here:

<https://archive.ukmeteornetwork.co.uk/reports/2022/stations/Kirton/index.html>

You will have seen the still image from UK0056 in Alan Smith's article.

If you choose a particular example meteor you will find images and short videos of the other cameras that caught it, and some graphs of the data.

OASI activists

We've have now entered the quiet season for meteors but there are still sporadics, although it has been very quiet to the north of my site since 12 Jan. Paul Whiting, however, enjoyed a very bright fireball whilst on an aurora trip in Norway, The next named showers are the April Lyrids and the η -Aquarids.

The OASI "Gang of Four Meteor Club" includes Alan Smith, James Appleton and Chris Albins (who also does radio detection of meteors).

If you fwould like to see what meteors have been spotted by the Global Meteor Network (which UKMON feeds) go to <https://tammojan.github.io/meteormap/>

NASA's Heliophysics: part 2

Library short article

Andy Willshere

Having prepared a new heliophysics article for the OASI magazine, it was with no little surprise that I noticed that the NASA homepage had a short article about forthcoming events in their heliophysics missions. In order not to rewrite the first article, I decided that the information warranted two episodes. These new missions will endeavour to survey in greater detail our Sun and near Earth weather, and consider how the two could be interconnected.

The two commissions have the catchy acronyms EUVST and EZIE. The former standing for Extreme Ultraviolet High-throughput Spectroscopic telescope Epsilon Mission, and is a programme investigating how solar winds are released and how they influence space radiation levels. The latter is the Electrojet Zeeman Imaging Explorer (EZIE), which will use a trio of 6U-CubeSats to research the auroral electrojet, a set of horizontal currents that flow in the D and E areas of the auroral ionosphere. These CubeSats measure either 10cm*20cm*30cm or 12cm*24cm*36cm and were described under the heading "WALL-E and EVE fly to Mars" in OASI magazine July 2020 edition.



Picture credit: NASA.

The EUVIST assignment was proposed by a multi-agency solar physics missions group in 2017. It has been designed to amass a monumental amount of UV spectroscopic data and evaluate the solar atmosphere in detail. The project launch will be set for 2026 and is managed by JAXA (Japanese Aerospace Exploration Agency). NASA's contribution is \$55 million, which will also include some hardware.

What does EUVIST do?

It is basically a high ultraviolet spectrometer with a slit-jaw imaging facility. It is hoped that questions pertaining to the Sun, for example, 'How is high temperature plasma created, and what effect does this have on the Earth and other planets' will be answered. It will also look into why the corona of the Sun (2×10^6 K) is far higher than its surface (6,000K). In the past, other instruments have been unable to track the movement of material and energy due mainly to poor resolution and instrument restrictions. EUVIST will gather this information over a much broader span of temperatures, without gaps in the spread. This will include nano-flare occurrences and blasts of solar winds.

In 2006, the Hinode (SOLAR-B) spacecraft launched, furnished with an optical telescope and a EUV spectrometer. This allowed for greater comprehension of magnetic movement. It did this by observing magneto hydrodynamic

waves. It could not however detect seamless temperature changes and spatial resolutions. EUVIST has been designed to accommodate these problems by:

- Covering seamlessly temperatures from 10,000K and 1-15 million Kelvin.
- Temporal (1 sec) and high spatial resolution (0.4 arcsec).
- Velocity resolution spectroscopy of 2 km/s.

This will allow scientific outcomes that include disclosing how solar atmospheres are formed and how it links to stellar atmospheres, and to understand the basic mechanisms of solar flares. Scientists will be able to gain a more valuable insight into plasma and atomic physics. Finally obtaining more information about the solar corona, flares and wind.

EZIE (Electrojet Zeeman Imaging Explorer) on the other hand will focus on the 'auroral electrojet'. This is a large horizontal current, which loops through the atmosphere at approximately 60 to 90 miles above Earth in the D and E regions. There are in fact two electrojets, one above the magnetic equator and the other near the Northern and Southern polar circles. The auroral electrojet currents are described as being very strong and continuous, and its conductivity is much greater at this level than at lower latitudes, as is its horizontal electric field. This extends into the Earth's magnetosphere, which with the solar wind causes a 'magnetotail' to occur during the nighttime. If the structure of the magnetotail is changed, it can intrude into radio and communication signals, as well as utility grids on Earth, and other spacecraft orbiting. In general, EZIE will study these currents coupling the Earth's magnetosphere to the aurora, and provide much needed information into the complex space weather systems circumnavigating Earth.

References:

[Two new NASA missions will help protect Earth from the Sun's raging outbursts \(inverse.com\)](#)

[NASA approves two new missions to study space weather - UPI.com](#)

<https://encyclopedia2.thefreedictionary.com/auroral+electrojet>

<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2013JA019377>

<https://www.ngdc.noaa.gov/stp/geomag/ae.html>

[Electrojet - Wikipedia](#)

Hawking's Black Hole Information Paradox – Is there a 'get out' clause?

A tiny glimpse of the problem!

Andy Willshere – Article from the Library

What do we understand as 'information'? Physicists consider this to be in the main about quantum data. All universal objects are composed of particles with unique quantum attributes, which are conserved within the Universe.

So, what happens when objects are swallowed by a black hole. Taking quantum mechanics, it is suggested that all information about a particles past state is retained and carried further as they evolve. This principle is called '**unitarity**'. However, black holes are adapted to general relativity which postulates that space and time fashion an undulating fabric with gravity being the contours of this fabric. Professor Stephen Hawking endeavoured to apply quantum mechanics to particles close by a black hole's periphery but also used Einstein's theory to detail gravity. At this point it was considered that 'unitarity' had broken down. This was described as the semiclassical approach. Dependant upon which of the two approaches are utilized, either information is carried out from black holes via their radiation and therefore the suggestion that unitarity exists, or as a black hole evaporates, so does data. This is a dilemma that has caused much contemplation as general relativity has a general acceptance except at black holes.

Hawking radiation was a theory put forward in 1974 in which black body radiation was liberated by black holes due to the quantum changes near to their event horizon. However his calculations showed that Hawking radiation did not preserve information. It is essential to consider that black holes lose energy and dissipate into the waiting universe emanating a spectrum. The results of this can be gleaned by analysing black hole thermal equilibrium integrated with redshifting results very near the event horizon, taking into account quantum entanglement issues.

Particle pairs are formed, one of which escapes at infinity whilst the other is held within the black hole horizon. In 2015 Hawking, with other physicists published on line further investigations into the paradox. Their idea was that when charged particles are pulled into a black hole, a two dimensional holographic imprint is left on the event horizon. This means that when Hawking radiation occurs, this information imprint provides data that can be transmitted back into the general Universe. However they were not 100% sure that this was the final answer to the problem. From new studies, some scientists have begun to query Hawking's theories, and suggesting that as the calculations demonstrated, that black hole radiation is exclusively thermal, it would seem that the radiation entropy would increase linearly until the black hole has totally vaporized. They have discovered within the limits of Einstein's theory contemporary additional gravitational formations, which were not considered by Hawking. These formations occur in greater numbers as the black hole gets older, and therefore it is suggested that information flows out, although quite how has not been fully explained. Theories using fundamental physics have been flashing across the ether, including quantum entanglement and space-time.

Early in the 1990's Don N Page, FRSC (theoretical physicist) spent time looking at all aspects of a black hole's life, i.e from before the start to the end. In laymans terms he suggested that a black hole decays from the exterior inwards. However he felt that more investigation was needed in quantum entanglement, which is when numerous particles are connected together in such a way that one particle's quantum state calculation decides other particles quantum states. Page calculated what would be the end point if he took the complete total of entanglement linking a black hole and its radiation. This is known as entanglement entropy. This would be zero at the start of a black hole and if information has been preserved, it will be zero when the black hole has evaporated. This will therefore produce a graphical curve in the shape of an inverted 'V'. He worked out that the point at which the graph started to drop to zero would be at halfway. Today this is called 'Page time'. So if the process of entanglement entropy follows Page time, then the black hole conserves information. This means in simpler terms, that taking all parts as a whole function, the black hole, inbound waves and departing radiation, any information that was in situ at the start would be preserved. Page calculated that radiation consists of information that is able to interact both with data remnants left in the black hole and also radiation emitted later.

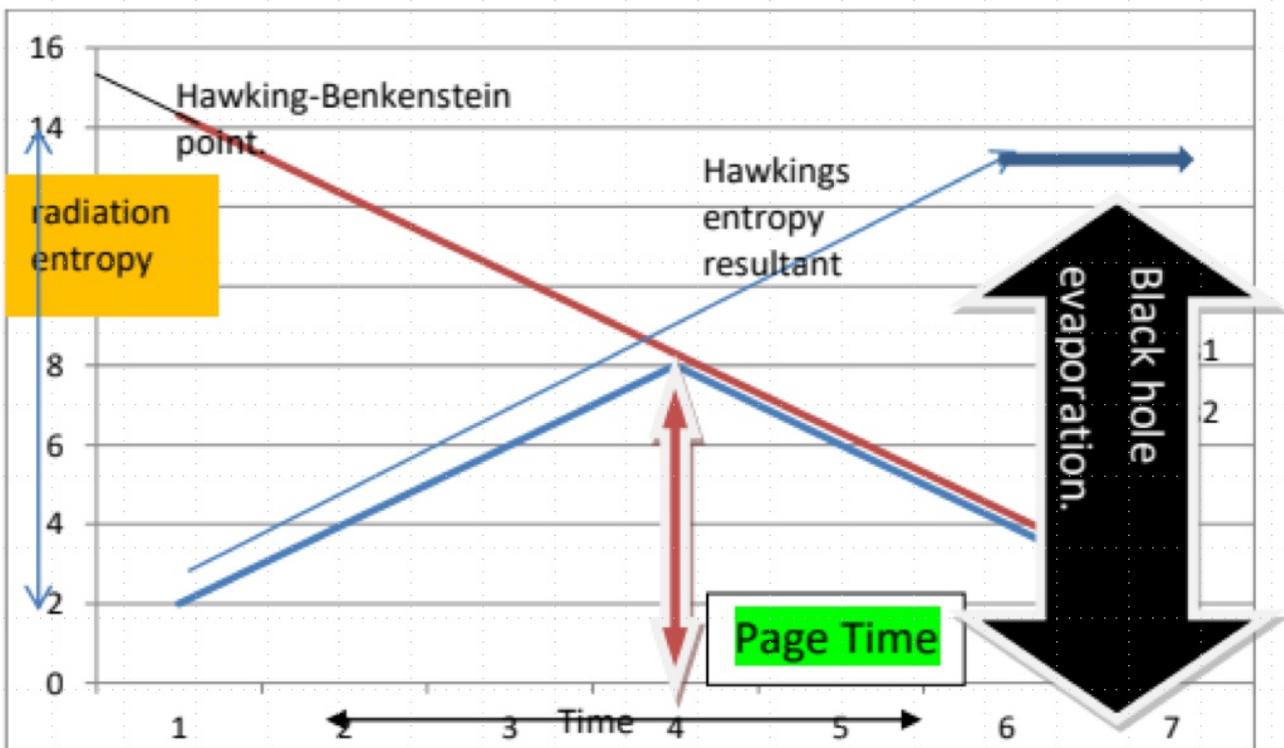


Diagram: Page Time. Information obtained from: Johannes-Eskilt-Dissertation.pdf (imperial.ac.uk)

Because this paradox has been out in the scientific community for the last 47 years, many scientists have contemplated analysing it in greater detail. Over the last few years, a large nexus of quantum gravity scientists have been working on it and making tremendous headway. One of these scientists Netta Engelhardt from MIT and her colleagues have worked out a new calculation that adjusts Hawking's 1974 formula. From this they reveal that *information* does escape a black hole via its radiation. They identified the "quantum extremal surface", an invisible surface that sits inside the event horizon, and showed that the information which is radiated away is encoded upon this surface. If *information* is conserved then the lack of predictability of the entirety existing outside the black hole, will have some value. This will increase and then return to its original value once the black hole has vaporized totally. This is the second possibility, with a third reflecting that perhaps the *information* turns up as non-thermal correlations within the Hawking radiation. This however would probably occur at a very slow rate and would be immensely difficult to calculate. Hawking considered that entropy increased, and upon reaching total evaporation it just reaches a quiescent period, at a value and doesn't change.

If you approach the paradox from the standpoint that you have zero understanding of the universe prior to black hole formation, then you will return to this state when the black hole has gone, especially as all the information that was absorbed has been returned to the cosmos. Therefore, entropy in this case quantifies lack of understanding. It therefore follows that if a black hole is created from zero entropy, once it evaporates, the Hawking radiation must decline back to zero.

The approach from this group then looked at calculating entropy in a contrasting way from Hawking, and to acquire a formula that was consistent with unitarity. This would mean that the entanglement entropy curve would begin at zero, because at this point, no radiation has been emitted, and would reach an upward point of increase (Page time), returning back to zero, as long as all information has been preserved. This was revisiting the work that Page had done earlier. They considered the extreme properties and conditions that characterize black holes, and what is described as the quantum corrected area of a specific surface interior. It was felt that this was a means to manipulate the quantum gravity estimation and acquire a unitarity result. The group decided that the calculation using the smallest quantum corrected area was the way forward and the calculated graph fulfilled the inverted V picture stated earlier. Space time, which is a mathematical paradigm that combines the dimension of time with the three dimensions of space, can be divided into two by the quantum extremal surface, the inside surface decoded by the leaking radiation and the outer, encrypted, stuck in the black hole's organization.

The object of the many groups of scientists beaver away at this paradox is specifically how does the **information** come out from the black hole and what process comprehension is necessary, especially for computational analysis. Scientists have reached the point that the Page curve can be calculated, suggesting that **information** leaks out of a black hole. Perhaps the entropy relation to Hawking radiation at the black hole's external borders and what remains inside has a direct effect on the internal construction of the black hole. Does this mean that the paradox has been solved. The answer seems to be that scientists concur that they are really just at the start of the journey, but the starship will eventually make journeys end.

References:

[Netta Engelhardt Has Escaped Hawking's Black Hole Paradox | Quanta Magazine](#)

[\[hep-th/9305040\] Black Hole Information \(arxiv.org\)](#)

[Black hole information paradox - Wikipedia](#)

If any readers have a specific astronomical interest that we could use to write a short article, please contact me via the OASI email.

Astro pictures

IC410 "The Tadpoles" in Auriga

Andy Gibbs



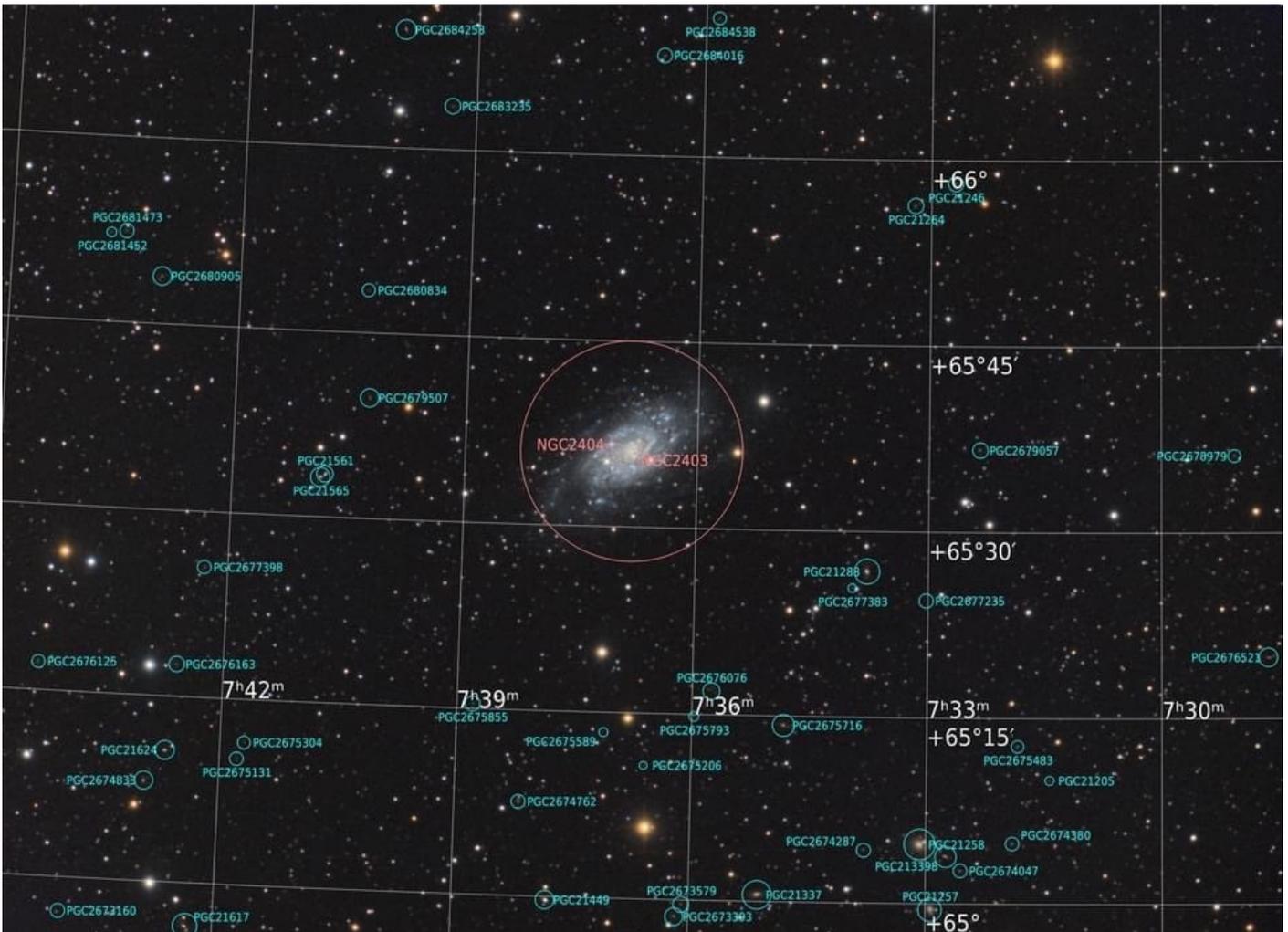
Imaged in Narrowband between 01-11-21 and 02-01-22.

Due to the lack of clear nights, it took me from 1 November 21 to 2 January 22 to gather enough data for this narrowband image.

There are 20x 600 sec frames in H α , 10x 600 sec frames in SII and 10x 600 frames in OIII. I also added dark, flat and bias frames, then processed in the Hubble palette, (H α =green, SII=red, OIII=blue).

Equipment used: Atik One 6.0 camera, Explore Scientific ED80 CF refractor on a HEQ5 Mount. Controlled by a PrimaluceLab Eagle 3.

Software used: Sequence Generator Pro and Affinity Photo.



Annotated image of NGC2403 & NGC2404,

Data

This image was captured on 4th January 2022 in LRGB. 20:20:20:20 subs with an exposure time of 5 minutes. Total integration time 6.6 hours.

Calibrated using Flats x 25, Dark Flats x 25 and Darks x 50.

Equipment

William Optics Z103 refractor.

ZWO ASI1600mm Pro Cool camera.

ZWO EFW.

Chroma 1.25" filters.

SkyWatcher EQ6R-Pro mount.

Software

Sequence Generator Pro for data acquisition and equipment management.

PHD2 for guiding.

PixInsight for squeezing the life out of the data.

Lower's Nebula

John Hughes

So named after father and son amateur astronomers, Harold and Charles Lower who discovered this HII region in 1939. It is also a member of the Stuart Sharpless catalogue where it is designated Sh2-261. This emission nebula is located in the constellation, Orion and can be found North of Betelgeuse. It is approximately 2,900 light years distant, 26 light years across and has a visual magnitude of +10. HaRGB Composite with subframes made up as follows 36:12:12:12. Exposure time 300s. Darks x 50; flats x 25 and dark flats x 25. William Optics Z103 refractor, ZWO ASI1600mm Pro Cool camera, ZWO EFW, Chroma 1.25" filters and a SkyWatcher EQ6R-Pro mount were used to capture this image.



Lower's Nebula

I returned to Lower's Nebula in Orion on the night of the 19th/20th January. It was a partially cloudy night and I didn't manage to capture all the data I wanted but was able to add some Sii (37 frames @ 300s) and Oiii (17 frames @ 300s) before the sky completely clouded over. All the equipment is the same as previously reported. I now have this SHO version with RGB stars added into the image from my earlier data.



Lower's Nebula with some Sii and Oiii

Horsehead and Flame Nebulae

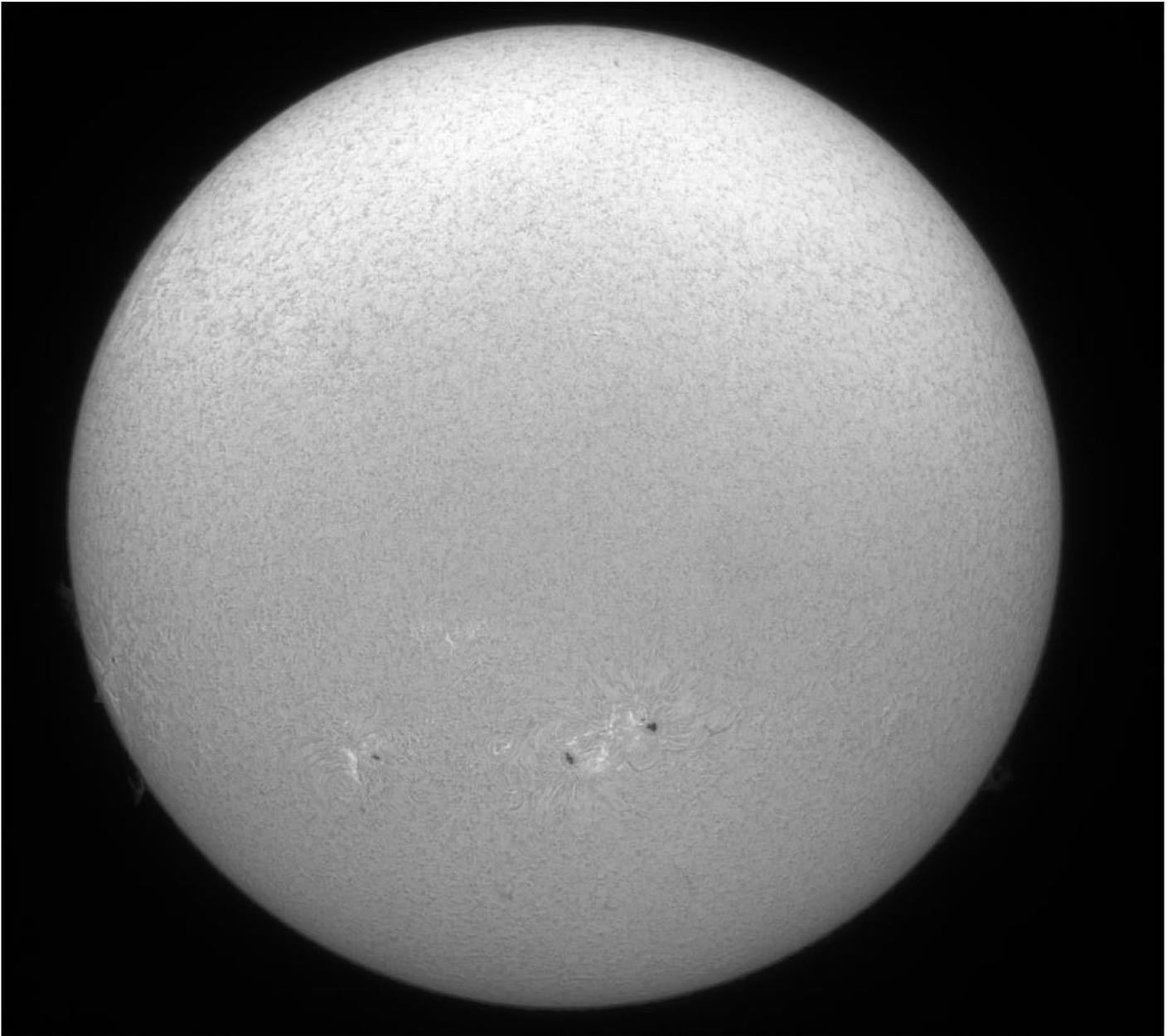
Stephen Solley



Imaged over 3 days this week. Very fortunate with clear skies over Ipswich since New Year....let's hope it continues.

The January Sun-day

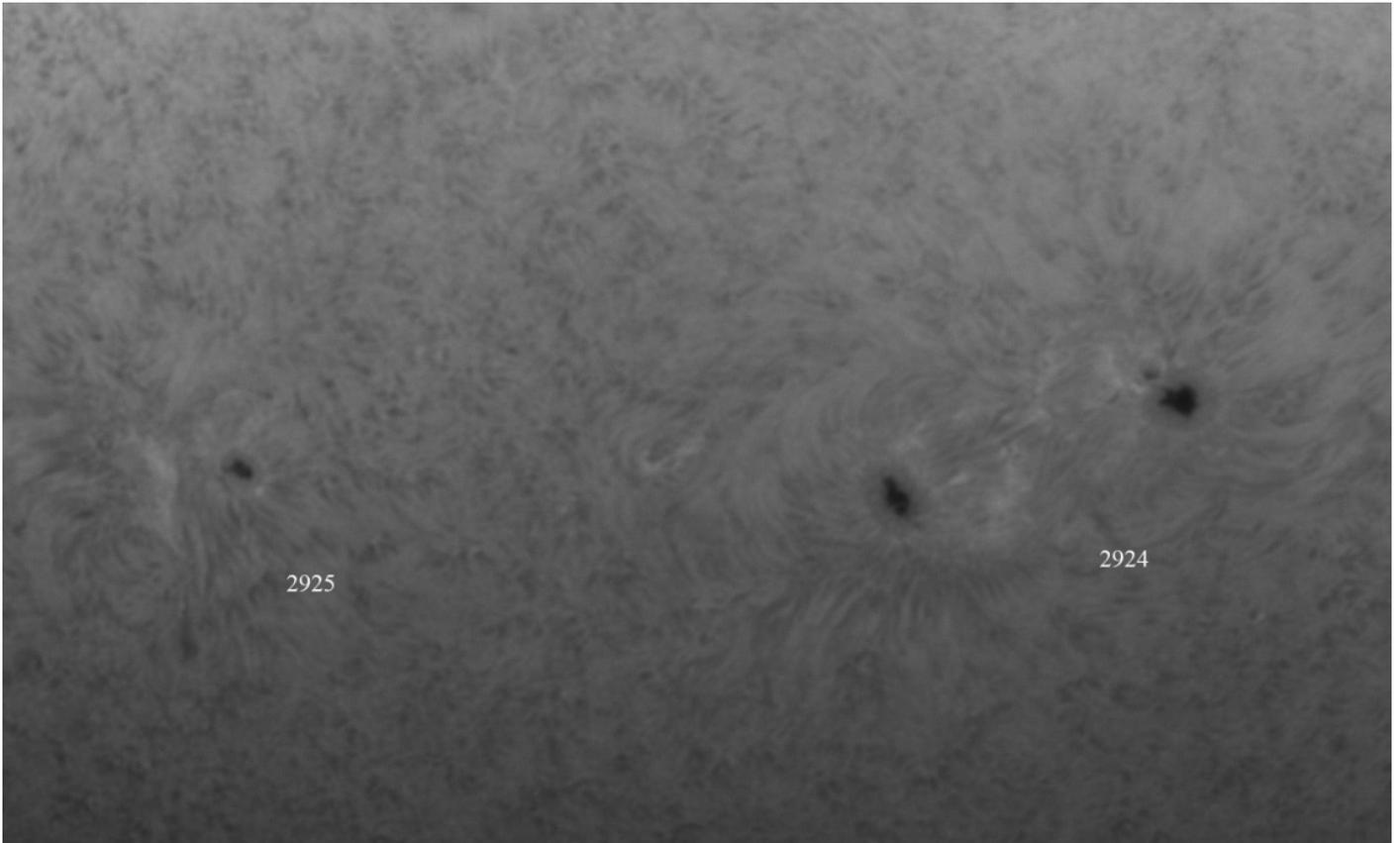
Martin Cook



The Sun on 9 January at 12:00 in H-Alpha

Lunt LS60THa/BI200 telescope and Zwo 178MM camera.

There are also a number of small prominences visible around the outside edge.



**This enlarged image of the sunspots was taken using a 2.5x barlow.
Two sunspot groups 2924 and 2925 are visible.**

Aurora Visit to Tromsø, North Norway – 19-22 February 2022

Paul Whiting FRAS

This particular trip had a big build up as it proved to be the first time I was able to escape the country since Covid came along. All previous attempts over the last two years had been thwarted by plague or storm!

After an intensive course of self-learning on what is required by the various authorities to allow travel to Norway and back, which itself kept changing from week to week, I embarked on the mammoth form filling exercise. Eventually I was armed with the necessary set of 6 QR codes, so let travel begin!

The journey to Tromsø was quite uneventful, except that we had to circle for 30 minutes to allow for the runway to be cleared of snow and to allow a “priority” flight to land ahead of us, which of course meant a further wait for the runway to be cleared again. We eventually landed safely. But this is where the adventure began ...

We landed at terminal C. I didn't know they had a terminal C. After de-planing we had to queue in the snow outside the makeshift cattle shed, sorry, temporary terminal arrival hall for us to pass through passport control. Here Brexit hit home. The one person with a French passport had a queue to herself. The “other nationalities” had to join the huge, snowy queue. After passport control (and two QR codes later), we were lining up for the mandatory arrivals lateral flow test (at least it was complimentary). After the nostril poking, we were given a code number to use on a web site that was to be texted to us half an hour later, but in the meantime were allowed to go.

So, after catching the free transfer bus to the main terminal and then catching the airport bus to the town centre, my test result arrived. I didn't have time to check the result before I arrived at the hotel. Luckily it was negative, but if it hadn't been, I could have infected two busloads as well as the hotel reception.

The weather forecast for Tromsø for the whole 3 nights I was there was dreadful, heavy snow showers with slight chance of broken cloud. So, I thought I would book the minibus tour for the Wednesday and Thursday nights, as these gave the best chance of some clear patches.

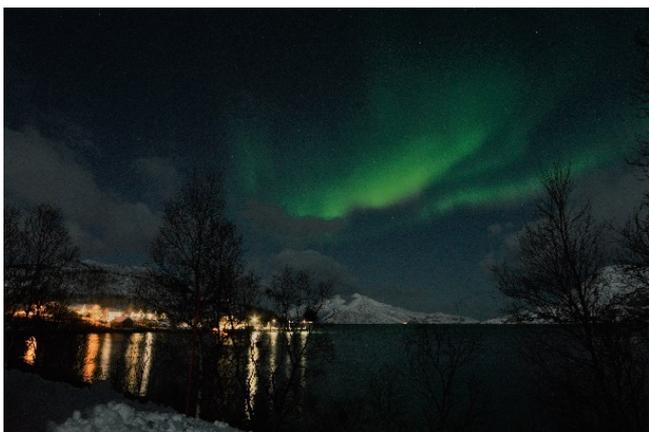
The first night started poorly and went downhill very rapidly from there. We saw a pathetic bit of green through a temporary hole in the cloud, but that was to prove to be it. Despite the over-enthusiastic guide telling us that we had to be patient and wait for “forecast” gaps in the cloud, he got the poor minibus driver to drive up and down the same bits of road many times as we first went North of Tromsø to find these elusive gaps and then South of the city. This didn't endear him to the driver, who got quite grumpy.

Finally, we ended up at a site I had been to before by a frozen lake. Here we had to wait until 1am before we could return home. The idea was that we had paid for this time away and come blizzards or high water we were going to stay there. Well, the blizzards did come, and despite feeding us with cheese-less cheese baguettes, hot chocolate and lefse (a most delicious Norwegian speciality cake, made with their unique brown cheese), we eventually mutinied and forced the return to a nice warm bed back at the hotel.

Let's see what day 2 has to offer. The forecast is better, but the solar parameters are not as good as the previous night.

The second night arrived. This time the weather behaved (mostly), with plenty of prolonged clear periods. Unfortunately, the Sun decided to go to sleep. However, there were one or two opportunities to see some quiet displays that happened to coincide with some clear sky. After a lot of driving around (this is after all the selling point of going on one of these minibus tours) we managed to find a site with the virtually full moon behind us, which nicely illuminated the foreground, and a clear “fjord” view to the north in front. This location was at Skulsfjord, on the island of Kvaløya, not that far from Tromsø itself.

The most notable event of the evening was a fireball, which was quite dramatic against a really dark background above an impressive mountain line. The track was long and slow, radiating west from Cygnus. Of course, no one caught it on camera.



The third and final day dawned. Today is Sol Dag in Tromsø – the day the Sun returns after its winter break. Again, the clouds parted briefly, just enough to see a hint of Sun in the southern horizon. Then the snow storm began. Minus 4 Celsius today, so the slush of the last two days that made walking around quite easy, had now turned to ice. I might just venture out as far as the pub today! I don't think I will be going on the minibus again tonight. Last night I got incredibly cold, despite wearing 6 layers, and the forecast is not terribly good for the weather nor the solar details. Besides I have to be up at 5.30am to catch the airport bus, and the last two nights I have been delivered to the hotel at 1.30am.

Overall it was nice to escape the ravages of Covid back home, even though the aurora left a bit to be desired.

Timely BBC News item: Aurora <https://www.bbc.co.uk/news/uk-scotland-highlands-islands-60028525>