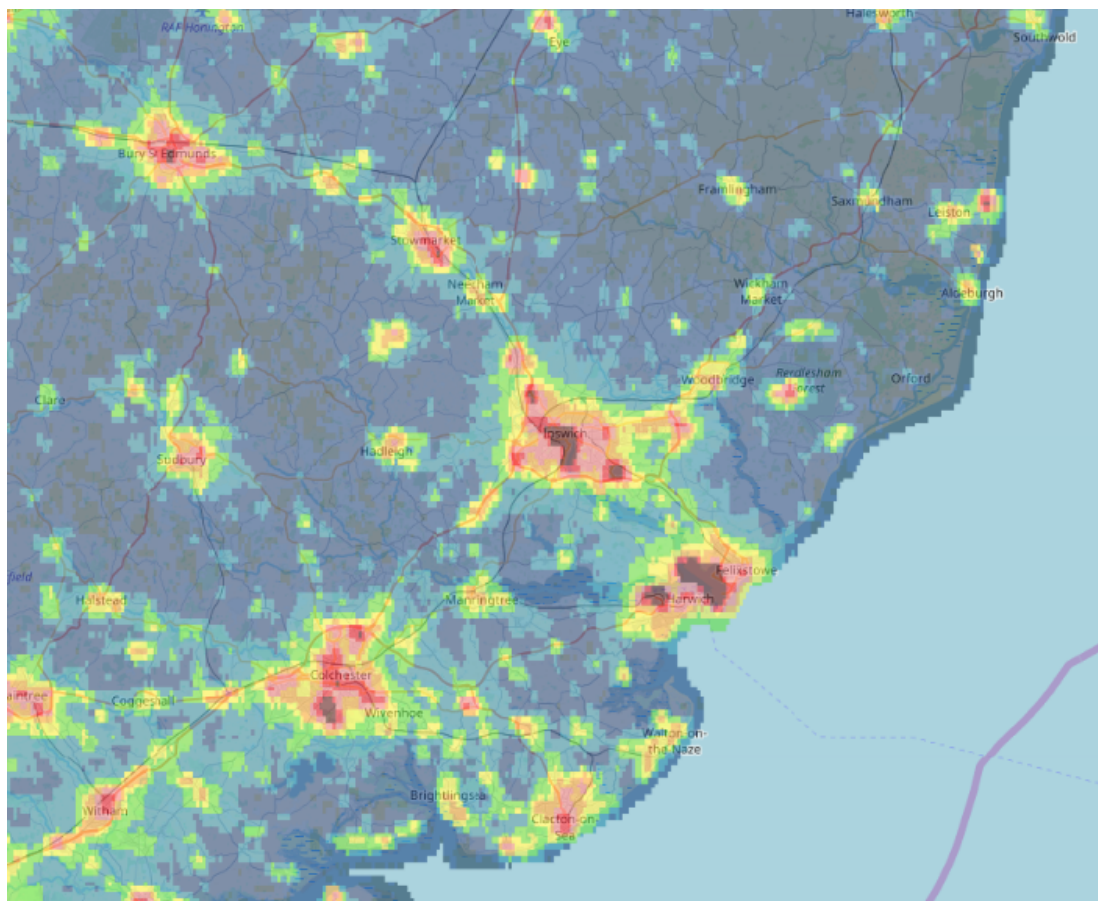




OASI News

The newsletter of the Orwell Astronomical Society



Light pollution in Suffolk and NE Essex– See page 32

Trustees: Mr Roy Adams Mr David Brown Mr David Payne
Honorary President: Dr Allan Chapman D.Phil MA FRAS

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Society Notices

Society Contact details

Observatory (meeting nights only)

NB new number! 07960 083714

Email queries: info@oasi.org.uk

Facebook: <https://www.facebook.com/groups/445056098989371/>

Twitter: @OASlpswich

The OASI Facebook pages are proving very popular. Several non-members are active contributors.

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

Other contact details will be issued to members on a separate printed list.

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, **07960 083714** during meeting hours. **Please note this is a new number. Kindly check/amend the number shown on your 2018 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. Please send them to

news@oasi.org.uk

The CLOSING date is the 15th day of the month

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](http://www.oasi.org.uk/NL/NL_form.shtml)

Authors, please note that your articles will now 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 2018

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

Signing in and out

Please ensure you sign in and out when visiting the Observatory and/or Newbourne.
This is for fire safety precautions and also provides an historic record.

Next Committee Meeting

Friday 7 September at Museum St Methodist Church rooms, Black Horse Lane.

Welcome New Member

Matt Fidler

OASI and BAA Events

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 or use this address to access this calendar from other calendar applications.



<https://calendar.google.com/calendar/ical/1jhs9db71ncki4sojo7092vfvc%40group.calendar.google.com/public/basic.ics>

For other astronomy news and astro pictures try our

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

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

Subscribe to the OASI Yahoo group by emailing oasi-subscribe@yahoogroups.com

Date, Time & Location	Contact	Event
Weekly, every Wednesday, 20:15–22:00 Orwell Park Observatory	Martin Cook, Roy Gooding	General observation (weather permitting) using a variety of telescopes. Entry via the third gate left. NOT the main gate
Mon 02 Jul 2018, 01:40 Location TBD	James Appleton info@oasi.org.uk	CANCELLED Field trip to observe the graze of γ Cap. More info.
Wed 04 Jul 2018, 02:50 Location TBD	James Appleton info@oasi.org.uk	CANCELLED Field trip to observe the graze of ψ^1 Aqr. More info.
Mon 09 Jul 2018, 19:00-late Newbourne Village Hall	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI@Newbourne. 19:30 Talk by Bill Barton on the night sky. Book swap: bring any books or DVDs concerning astronomy, space-travel, sci-fi or popular science and swap them for something different. Cash donations accepted if you want to take something but don't have an item to swap. NB: items not swapped must be taken home! Observing or informal talks, depending on the weather. Bring your telescope to our dark-sky site.
Sat 14 Jul 2018, 13:00-late Newbourne Village Hall	Pete Richards lectures@oasi.org.uk	Summer BBQ , open to members of OASI and their guests. Barbecue lighting time: 3.00pm. Bring your own drinks and food to barbecue; in case of bad weather, bring picnic food to eat in the hall. Solar observing (if the sky is clear!)

Date, Time & Location	Contact	Event
Mon 23 Jul 2018, 19:00-late Newbourne Village Hall	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI@Newbourne. 19:45: Astronomy Workshop presented by Andy Gibbs: <i>Basic Astrophotography</i> . A beginners guide to astrophotography, showing what can be achieved with very basic equipment, like smartphones, compact digital cameras and entry-level DSLR cameras. Later: observing (weather permitting). Bring your telescope to our dark-sky site.
Mon 13 Aug 2018, 19:00-late Newbourne Village Hall	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI@Newbourne. 19:30 Talk by Bill Barton on the night sky. Book swap: bring any books or DVDs concerning astronomy, space-travel, sci-fi or popular science and swap them for something different. Cash donations accepted if you want to take something but don't have an item to swap. NB: items not swapped must be taken home! Observing or informal talks, depending on the weather. Bring your telescope to our dark-sky site.
Mon 27 Aug 2018, 19:00-late Newbourne Village Hall	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI@Newbourne. Bring your telescope to our dark-sky site. (Talks on astronomy if weather unsuitable for observing.)
Sun 02 Sep 2018, 10:00-16:00 Bentley Village playing field (bottom of Case Lane).	Roy Gooding secretary@oasi.org.uk	Public access event. Solar observing. Booking not necessary.
Mon 03 Sep 2018, 02:30 Location TBD	James Appleton info@oasi.org.uk	Field trip to observe the graze of H 21630. More info.
Mon 10 Sep 2018, 19:00-late Newbourne Village Hall	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI@Newbourne. 19:30 Talk by Bill Barton on the night sky. Book swap: bring any books or DVDs concerning astronomy, space-travel, sci-fi or popular science and swap them for something different. Cash donations accepted if you want to take something but don't have an item to swap. NB: items not swapped must be taken home! Observing or informal talks, depending on the weather. Bring your telescope to our dark-sky site.

Date, Time & Location	Contact	Event
Fri 21 Sep 2018, 20:00 St Augustine's Church Hall	Pete Richards lectures@oasi.org.uk	Lecture Meeting. Dr Lorne Whiteway, Honorary Research Associate at University College London , <i>Can the World's Largest Digital Camera Answer Cosmological Questions?</i>
Mon 24 Sep 2018, 19:00-late Newbourne Village Hall	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI@Newbourne . Bring your telescope to our dark-sky site. (Talks on astronomy if weather unsuitable for observing.)
Fri 28 Sep 2018, 19:00-late Broomhill Library	Paul Whiting, FRAS chairman@oasi.org.uk	Talk and telescopes evening.
Mon 8 Oct 2018	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI@Newbourne . 19:30 Skynotes by Bill Barton. Book swap. Bring your telescope to our dark-sky site. (Talks on astronomy if weather unsuitable for observing.)
Mon 22 Oct 2018, 10:00-16:00 Norwich Science Festival, Astronomy Day .	Roy Gooding secretary@oasi.org.uk	Public access event. OASI display. Booking not necessary.
Mon 22 Oct 2018	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI@Newbourne . Bring your telescope to our dark-sky site. (Talks on astronomy if weather unsuitable for observing.)
Fri 26 Oct 2018, 20:00 St Augustine's Church Hall	Pete Richards lectures@oasi.org.uk	Lecture Meeting. Dr Matt Bothwell, Institute of Astronomy, University of Cambridge , <i>Monsters in the Dark: Searching for the Most Massive Galaxies in the Universe</i> .
Mon 12 Nov 2018	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI@Newbourne . 19:30 Skynotes by Bill Barton. Book swap. Bring your telescope to our dark-sky site. (Talks on astronomy if weather unsuitable for observing.)
Fri 23 Nov 2018, 20:00 St Augustine's Church Hall	Pete Richards lectures@oasi.org.uk	Lecture Meeting. Martin Lewis , <i>Imaging with a Dobsonian</i> .

Date, Time & Location	Contact	Event
Mon 26 Nov 2018	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI@Newbourne . Bring your telescope to our dark-sky site. (Talks on astronomy if weather unsuitable for observing.)
Tue 27 Nov 2018, 04:00 Location TBD	James Appleton info@oasi.org.uk	Field trip to observe the graze of 85 Gem. More info.
Tue 27 Nov 2018, 22:15 Location TBD	James Appleton info@oasi.org.uk	Field trip to observe the graze of δ Cnc. More info.

Outreach meetings

Other meetings in planning

Holywells Park Family Day - usually the first Wednesday in August.

Broomhill Library, 28 September. Paul Whiting is not available to attend, so Martin RH will attend and give a presentation aimed at children.

Norwich Science Festival Astronomy Day, 22 October.

Lecture Meetings

Contact: Peter Richards
lectures@oasi.org.uk

We have an exciting and interesting set of lectures by guest speakers for the Autumn.

There is a new venue for lectures this year which is:

St Augustine's Church Hall
Bucklesham Road
Ipswich IP3 8TH.

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



OASI Guest Speaker Lectures for 2018

Friday 21st September

"Can the World's Largest Digital Camera Answer Cosmological Questions?" Dr Lorne Whiteway, University College London,

Friday 26th October

"Monsters in the Dark: searching for the Universe's most massive galaxies" Dr Matt Bothwell, Institute of Astronomy, University of Cambridge.

Friday 23rd November

"Imaging with a Dobsonian" Martin Lewis, Lunar and Planetary Imager.

OASI @ Newbourne

Martin Richmond-Hardy newbourne@oasi.org.uk

We normally meet at Newbourne Village Hall, Mill Lane, IP12 4NP on the 2nd and 4th Mondays (with a few exceptions, like December and January).

OASI @ Newbourne is a good place to start for beginners. If you are thinking of buying a scope or binoculars, come and try before you buy and talk to owners about the strengths and weaknesses of particular models. If you've already splashed the cash, bring your new scope along to use or for advice on setting-up and adjustment. All welcome, with or without telescopes. We would like visitors to join OASI to enjoy the full benefits of membership.

There are also **Stargazers' Guide, Astronomy Workshops and the Book Swap.**

Stargazer's guide

On the first meeting each month Bill Barton FRAS will give a short presentation of what can be viewed in the following 4 weeks. For armchair stargazers (on those cloudy nights) there is a small branch of the OASI Library held at Newbourne and a copy of the full catalogue.

OASI@Newbourne Meetings in 2018

9 July (S+B)	23 July	13 Aug (S+B)	27 Aug
10 Sept (S+B)	24 Sept		

We open up for all meetings at 7pm. Star Guide (S) at 7:30pm and Workshops (W) at 7:45pm.
B = Book Swap night (see below).

Astronomy Workshops

Contact Mike Whybray

Location: Newbourne Village Hall IP12 4NP

Doors open at 7:00pm.

Workshops start at 7:45pm

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. They are also a chance to chat with other members over a cup of tea and a biscuit, in a venue rather warmer than the observatory dome on a winter's night!

Given a clear night, we can make use of the field for a workshop or continue afterwards with some observing – something not possible at the previous venue, Nacton village hall.

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

23 July Andy Gibbs on Basic Astrophotography.

A beginners guide to Astrophotography, showing what can be achieved with very basic equipment, like Smartphones, Compact Digital Cameras and entry-level DSLR cameras.

TBA Martin Cook on Tomline Refractor Training (at the Observatory)

Astronomy Book Swap

Pete Richards

If you are anything like me you'll have a bookcase or two full of astronomy books and no room for any more but you know the next time you are at an astronomy event you'll be tempted again. OASI will be hosting an astronomy book swap event at Newbourne on a Monday evening help you to clear some space or maybe you can provide a home for someone else's unwanted books.

If you bring any books and they are not taken you will need to take them home again as OASI has no spare storage space for books.

You can take away any books you are interested in but if you have not provided any books yourself you might like to make a small cash donation to OASI.

Any cash donations will help towards running OASI @ Newbourne.

The books can be on any area of astronomy, or space exploration, or related subjects. They can be factual or works of fiction including space related science fiction. As well as books you could bring DVDs on similar subjects, or maybe you have an astronomical jigsaw puzzle you'd like to give away or exchange.

The book swap will be held at Newbourne Village Hall on Monday Star Guide/Workshop nights (a normal oasi @ newbourne night). **The next event will be held on 9 July.**

Other local astronomy society meetings

Athaneum Astro Soc

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

We meet fortnightly on Thursdays, from 7.30pm, at our dark-sky site in the [Walled Garden](#) at Nowton Park, just outside Bury St Edmunds. If you're planning on joining us for the first time, please [contact us](#) in advance, just to make sure the meeting is going ahead. We recommend that you wear warm clothing (even summer nights can be chilly, especially when the skies are clear!) and bring a flask, or insulated mug, for a warm drink. We have tea and coffee-making facilities on-site. Events are listed here <http://www.3a.org.uk/events.htm>

Thursday, 5 July	Luminosity magnitudes and distance: Phil
Thursday, 19 July	Introduction to Radio Astronomy: Phil
Thursday, 2 August	How stars make elements: Richard
Thursday, 16 August	Basic optics: Phil
Thursday, 30 August	Variable stars: Richard

LYRA Lowestoft & Yarmouth Regional Astronomers

www.lyra-astro.co.uk

LYRA Programme and Local Events 2018 – All talks (unless other wise stated) will commence at 7.30pm in the Coach House Room at Parkhill Hotel, just outside Oulton Village on the B1375 (Oulton Broad to Gt. Yarmouth Road) NR32 5DQ

All Talks £2.50 For Non Members

10 July	Inaugural talk by President Matthew Bothwell, From Big Bang to the Big Rips! A History of Modern Cosmology
24 July	LYRA Observing/Practical night at Barn Car Park, Parkhill Hotel from 7.30pm
14 Aug	Summer Social Evening at Parkhill Hotel
11 Sept	Talk by Jonathan Gale, Webb Society Committee "Observing Astronomical Asterisms"
25 Sept	LYRA Observing/Practical night at Barn Car Park, Parkhill Hotel from 7:30pm
9 Oct	Talk by Dr John Rogers, BAA Jupiter Section Director "Jupiter and the Juno mission"
23 Oct	LYRA Observing/Practical night at Barn Car Park, Parkhill Hotel from 7:30pm
13 Nov	Talk by Bob Argyle, President of the Webb Society "Observing Double Stars Past & Present"
27 Nov	LYRA Observing/Practical night at Barn Car Park, Parkhill Hotel from 7:30pm

DASH Astro

Darsham And Surrounding Hamlets

<http://dash-astro.co.uk>

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 at WESTLETON VILLAGE HALL from 7:30 pm.

Note these are now on Sundays.

- | | |
|---------|--|
| 15 July | Solar Observing - Location TBA
(Sunset 21:09 Moonset 22:48 9% Moon) |
| 11 Aug | (Saturday) DASH Summer Social
Irene's confirmed. (Members and Guests only) |
| 09 Sept | Dash Observing Session (Sunset 19:23 Moonset 19:39 0.2% Moon) |
| 23 Sept | Meeting – Bob Greef. Title tbc. |
| 07 Oct | Dash Observing Session (Sunset 18:17 Moonset 18:04 4% Moon) |
| 21 Oct | Meeting – S.Hubbard / D.Gwynn: Colliding Neutron Stars ... evidence? |
| 11 Nov | Dash Observing Session (Sunset 16:06 Moonset 18:59 16% Moon) |
| 25 Nov | Meeting – Dave Green: Distances to Stars and Galaxies. How do we measure? |
| 08 Dec | (Saturday) DASH Christmas Social – Irene's confirmed (Members and Guests only) |



News from the Interweb

Saturn moon a step closer to hosting life

<https://www.bbc.co.uk/news/science-environment-44630121>

Interstellar visitor's identity solved (Oumuamua)

<https://www.bbc.co.uk/news/science-environment-44630125>

JWST: Launch of Hubble's successor pushed back to 2021

<https://www.bbc.co.uk/news/science-environment-44631661>

The Night Sky in July

Martin RH

All event times given are for the location of Orwell Park Observatory 52.0096°N, 1.2305°E

Times are in BST unless otherwise stated

Moon

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

New Moon	1 st Quarter	Full Moon	Last Quarter
13 July 03:48	19 July 20:52	28 June 05:53 27 July 21:20	06 July

Sun, Moon and planets

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

Object	Date	Rise	Set	Mag.	Notes
Sun	1	04:39	21:18		Aphelion July-06
	31	05:15	20:47		
Moon	1	23:15	07:44		Perigee 357,431 km 13 July 09:25
	31	22:31	08:49		Apogee 406,223 km 27 July 06:44
Mercury	1	06:43	22:35	0	In evening sky until early August, and favourable for observation Max. eastern elongation 2018-Jul-12 (26°)
	31	07:00	20:40	2.6	
Venus	1	08:20	23:17	-3.9	In the evening sky until October 2018 Maximum elongation and half phase on August 17 (46°)
	31	09:38	22:07	-4.1	
Mars	1	23:17	06:58	-2.2	Perihelic Opposition July 27, but very low altitude
	31	21:18	04:14	-2.8	
Jupiter	1	16:20	01:45	-2.2	
	31	14:25	23:43	-2	
Saturn	1	20:47	04:34	0	Saturn was at opposition on 27 June
	31	18:41	02:26	0.2	
Uranus	1	01:17	15:17	5.8	
	31	23:17	13:22	5.8	
Neptune	1	23:59	10:55	7.9	
	31	22:00	08:55	7.8	

- *Pluto is at opposition 2018-Jul-12*

Paul's Astronomy Podcast for July

Paul Whiting FRAS Podcast, July 2018 www.oasi.org.uk/2018_07_pod.mp3

Occultations during July 2018

James Appleton

The table lists occultations during the month under favourable circumstances. The data relates to Orwell Park Observatory, but will be similar at nearby locations.

The events should be readily visible in small telescopes or binoculars. The first two columns list the date and time (UT) of the occultation. Column three gives the phenomenon: 'D' denotes a disappearance and 'R' a reappearance. The table lists circumstances of disappearances and reappearances as dictated by the visibility of each phenomenon (determined by altitude, lunar phase, etc). Column four details the lunar phase ('+' for waxing and '-' for waning). Columns five and six give the altitude of the Sun and the star, both in degrees. (A negative solar altitude means that the Sun is below the horizon.) Columns seven and eight provide the star's magnitude and catalogue number.

Only one lunar occultation occurs during July under favourable circumstances, detailed below.

The data relates to Orwell Park Observatory, but will be similar at nearby locations.

Please note that **times are shown in UTC**.

Date	Time (UT)	D/R	Lunar Phase	Sun Alt(°)	Star Alt(°)	Mag	Star
22 Jul	22:05:57	D	0.79+	-14	16	7.4	ZC 2341

Meteor showers

Source: BAA Handbook 2018 p97-99

Shower	Maximum	Normal limits	ZHR at Max	Notes
α -Cygnids	Jul 21 Aug 21	Jul – Aug	5	Weak, apparently stationary radiant, producing steady activity throughout the northern summer.
Capricornids	Jul 9 Jul 16 Jul 26	Jul – Aug	5	Bright yellow-blue meteors. May have three maxima and multiple radiant. Favourable in first half of July.
δ -Aquarids	Jul 29 Aug 6	Jul 15 – Aug 20	20 10	Fine southern shower with double radiant.. S component is the richer. Meteors tend to be faint.
α -Capricornids	Aug 2–3	Jul 15 – Aug 20	5	Long slow fireballs are often seen.
ι -Aquarids	Aug 6	Jul – Aug	8	Rich in faint meteors. Double radiant. Favourable.

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

Martin RH

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

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

Date	Mag	Start			Highest point			End		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
06 Jul	-1.7	03:45:39	10°	S	03:47:52	17°	SE	03:50:05	10°	E
07 Jul	-1.3	02:55:02	10°	SSE	02:55:54	11°	SE	02:56:47	10°	ESE
08 Jul	-2.6	03:36:54	11°	SSW	03:39:37	28°	SSE	03:42:31	10°	E
09 Jul	-2.1	02:46:27	17°	S	02:47:32	19°	SE	02:50:00	10°	E
10 Jul	-3.4	03:28:35	12°	SW	03:31:25	46°	SSE	03:34:36	10°	E
11 Jul	-2.9	02:38:02	24°	SSW	02:39:15	32°	SSE	02:42:15	10°	E
12 Jul	-2	01:47:27	22°	SE	01:47:27	22°	SE	01:49:46	10°	E
12 Jul	-3.8	03:20:04	11°	WSW	03:23:15	67°	SSE	03:26:32	10°	E
13 Jul	-4	02:29:26	26°	SW	02:31:00	51°	SSE	02:34:13	10°	E
14 Jul	-3.2	01:38:43	36°	SSE	01:38:47	36°	SSE	01:41:51	10°	E
14 Jul	-3.9	03:11:47	10°	W	03:15:05	82°	S	03:18:24	10°	E
15 Jul	-2	00:47:58	19°	ESE	00:47:58	19°	ESE	00:49:24	10°	E
15 Jul	-3.9	02:20:34	19°	WSW	02:22:46	72°	SSE	02:26:03	10°	E
15 Jul	-3.9	03:55:55	10°	W	03:59:14	80°	S	04:02:31	10°	E
16 Jul	-3.8	01:29:43	43°	SSW	01:30:29	56°	SSE	01:33:43	10°	E
16 Jul	-4	03:03:35	10°	W	03:06:54	86°	S	03:10:12	10°	E
17 Jul	-3.2	00:38:44	37°	SE	00:38:44	37°	SE	00:41:20	10°	E
17 Jul	-4	02:11:20	11°	W	02:14:32	85°	S	02:17:51	10°	E
17 Jul	-4	03:47:43	10°	W	03:50:59	63°	SSW	03:54:14	10°	ESE
17 Jul	-2.1	23:47:29	20°	ESE	23:47:29	20°	ESE	23:48:53	10°	E
18 Jul	-4	01:20:02	20°	WSW	01:22:11	76°	S	01:25:29	10°	E
18 Jul	-3.9	02:55:21	10°	W	02:58:39	77°	S	03:01:56	10°	ESE
18 Jul	-2	22:55:11	15°	ESE	22:55:11	15°	ESE	22:56:15	10°	E
19 Jul	-3.9	00:27:32	18°	WSW	00:29:51	62°	SSE	00:33:06	10°	E
19 Jul	-3.9	02:02:59	10°	W	02:06:16	85°	S	02:09:35	10°	E
19 Jul	-3	03:39:28	10°	W	03:42:36	42°	SSW	03:45:45	10°	SE
19 Jul	-3.6	23:34:22	10°	SW	23:37:31	46°	SSE	23:40:42	10°	E
20 Jul	-4	01:10:35	10°	W	01:13:54	86°	S	01:17:11	10°	E
20 Jul	-4	02:47:03	10°	W	02:50:18	57°	SSW	02:53:32	10°	ESE
20 Jul	-3	22:42:15	10°	SW	22:45:14	33°	SSE	22:48:13	10°	E
21 Jul	-4	00:18:12	10°	WSW	00:21:29	80°	S	00:24:48	10°	E

Date	Mag	Start			Highest point			End		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
21 Jul	-4	01:54:39	10°	W	01:57:57	72°	SSW	02:01:13	10°	ESE
21 Jul	-3	03:31:18	10°	W	03:34:07	26°	SSW	03:36:55	10°	SSE
21 Jul	-2.6	21:50:21	10°	SSW	21:52:59	22°	SSE	21:55:38	10°	E
21 Jul	-3.9	23:25:50	10°	WSW	23:29:06	67°	SSE	23:32:23	10°	E
22 Jul	-4	01:02:15	10°	W	01:05:33	83°	S	01:08:50	10°	E
22 Jul	-3	02:38:46	10°	W	02:41:51	37°	SSW	02:44:55	10°	SE
22 Jul	-3.7	22:33:32	10°	WSW	22:36:43	51°	SSE	22:39:56	10°	E
23 Jul	-4	00:09:49	10°	W	00:13:07	86°	S	00:16:25	10°	E
23 Jul	-4	01:46:18	10°	W	01:49:06	47°	SW	01:49:06	47°	SW
23 Jul	-3.2	21:41:20	10°	SW	21:44:23	37°	SSE	21:47:28	10°	E
23 Jul	-4	23:17:24	10°	W	23:20:41	83°	S	23:23:58	10°	E
24 Jul	-4	00:53:51	10°	W	00:57:07	67°	SSW	00:57:14	67°	S
24 Jul	-3.9	22:24:58	10°	WSW	22:28:15	72°	SSE	22:31:32	10°	E
25 Jul	-4	00:01:24	10°	W	00:04:41	80°	S	00:05:59	34°	ESE
25 Jul	-3.7	21:32:36	10°	WSW	21:35:50	56°	SSE	21:39:04	10°	E
25 Jul	-3.9	23:08:57	10°	W	23:12:14	86°	S	23:14:55	15°	E
26 Jul	-2.7	00:45:25	10°	W	00:47:31	32°	WSW	00:47:31	32°	WSW
26 Jul	-3.9	22:16:28	10°	W	22:19:46	85°	S	22:23:04	10°	E
26 Jul	-3.9	23:52:56	10°	W	23:56:11	62°	SSW	23:56:33	57°	SSE

Iridium flares

Too many to list but see <http://heavens-above.com/IridiumFlares.aspx>

[Iridium flares to cease by end of 2018 | BBC Sky at Night Magazine](#)

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, 1.40pm on the Lesley Dolphin show on BBC Radio Suffolk – now digital (channel 10c) and FM 103.9 (Ipswich), 104.6 (west Suffolk), 95.5 (Lowestoft), 95.9 (Aldeburgh) and the internet. <https://www.bbc.co.uk/radiosuffolk>

The next Grazes

Alan Smith

Due to the "silly o'clock" timings of these grazes, no expeditions are planned.

Monday 2 July	http://www.oasi.org.uk/Occs/Occ_summary_2018.php#Grazes	James Appleton info@oasi.org.uk\	Field trip to observe the graze of γ Cap.
Wednesday 4 July			Field trip to observe the graze of ψ 1 Aqr.

BAA news

New BAA Observing Challenge

The latest BAA observing challenge is posted on our website. Jupiter is in an excellent position for imaging, and as the evenings warm up a little, it is much more pleasant to be outside at night, even just to sit in the garden, with perhaps a small glass of something, and just admire its pure beauty with binoculars.

Proposed by Damian Peach, he says, "Jupiter is once again in prime viewing position this month, and this presents an ideal opportunity to try your hand at photographing the solar system's largest planet."

He continues, "It comes to opposition on May 9th 2018 and will be visible throughout the night shining brilliantly at magnitude -2.4. Today modern high speed video cameras are providing us with views of Jupiter in such extraordinary detail, that the finest amateur imagery made today approaches that taken by the world's largest mountain-top observatories. Such images in recent years have allowed the general meteorology of the Jovian atmosphere to be observed in unprecedented detail. Even small amateur telescopes equipped with a webcam can produce valuable imagery."

Good luck and looking forward to seeing lots of images and drawings appear on the BAA community pages and member pages.

BAA Diary Dates

7- 8th July 2018 - BAA Summer Meeting and BAA-AAVSO Joint Variable Star Meeting at Warwick University. Two for the price of one - two parallel events take place in two adjacent lecture theatres, covering '*Exploring Solar Systems, near and far*'. One caters for planetary astronomers and the other is more focused on variable stars. Bookings are still open for this, and it promises to be a fascinating event, with many already booked to come from overseas.

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

29th September 2018 - [Observer's Workshop - Variable Stars, Photometry and Spectroscopy](#). Burlington House, Piccadilly, W1J 0DU. Details to be released soon.

OASI Summer Barbecue at Newbourne

**Saturday July 14th 2018 at
Newbourne Village Hall
Mill Road IP12 4NP**

From 1pm until late

**Solar Observing (if the Sun is
shining!)**

**Bring your own food to barbecue
and drinks**

**In the case of bad weather bring
picnic food to eat in the hall**

Barbecue lighting up time: 3pm

**Open to all OASI members and
their friends and family**



Recent OASI public events

OASI at the Kirton & Falkenham Fete



OASI at the Kirton & Falkenham Fete, Saturday 2 June 2018 – without much sun

Paul Whiting, Andy Gibbs, John Wainright, Joe Startin, Mike Norris, Mike O'Mahoney and Martin RH were in attendance.

Photo by Andy Gibbs

OASI at East Suffolk Wireless Revival in Kirton 11 June



Photo by Bill Barton

Needless to say the Sun shone all the way home!

OASI at Sutton Hoo 16/17 June

Saturday



Photo by Bill Barton

Sunday



Photo by Martin RH

Roy G, Paul W, Bill B, John W, Pete & Nicky R, Andy G, Joe S and Martin RH attended Paul G4YQC operated a special event radio station GB4OAS on the Sunday (aerial in the corner) to add some non-solar interest.

The satellite dish was not for watching the football but to show the Sun emits not just light and heat, even behind clouds. Equipment comprised a standard satellite dish and LNB plus a modified Satellite Finder.

Library thoughts: Hawking Radiation

from Andy Willshere

Recently, we have considered the life and times of Professor Stephen Hawking. I thought that it would be an idea to try to write a few basic notes, keeping away from the math, on his Radiation and 'soft hair' theories.

His basic premise was that in classical theory, particle emission from black holes is unachievable and only absorption can occur. In mechanical quantum theory the effects cause black holes to both generate and emit particles as if they were hot bodies with a specific temperature.

Looking at our basic comprehension of black holes, and our knowledge of Einstein's general theory of relativity, all information that crosses the event horizon is lost in perpetuity. At the beginning of the 1970's, Hawking suggested that due to the laws of quantum mechanics, radiation could break free from a black hole. In 1975 Hawking expounded his theory that radiation is theoretically emitted impulsively from around the event horizon level of a black hole. The main factor in understanding this concept is the creation of virtual particles. These particles are considered to be transient variations that show some of the essential qualities of an ordinary particle, but subsists via Heisenberg's uncertainty principle in quantum field theory. He then went on to suggest that in a quantum vacuum due to this uncertainty principle matter particle / anti matter particle pairs materialise from the vacuum and then swiftly annihilate. With this in mind he suggested that just on the outskirts of the event horizon of a black hole, one of these subatomic particles that has negative energy can be snared due to the massive gravitational pull, and retained. This negative particle finds itself in a region within the black hole where the mathematical Killing vector (named after Wilhelm Killing) for time can reproduce the particle as

real. The other particle escapes to infinity forming a very low energy segment of thermal emission. Because of this, these particle pairs will not be able to annihilate. This is considered to be 'Hawking Radiation'. Theoretically the loss of this particle will therefore slowly reduce the black hole mass until it eventually dematerialises. The blackbody spectrum of this radiation would conform to a temperature that is proportionally reciprocal to the black hole's mass.

A theoretical approach to gravity according to the function of quantum mechanics culminates in quantum gravity. This takes us away from Einstein's theory of relativity and today's understanding of gravity calculated via classical physics. One main problem of substantiating quantum gravity is that the effects of this only appear at scales around the Planck scale, 10^{-35} m. This means that generated energy levels are far greater than levels propagated by high energy particle accelerators. This means that it is difficult to obtain definitive data to substantiate theories.

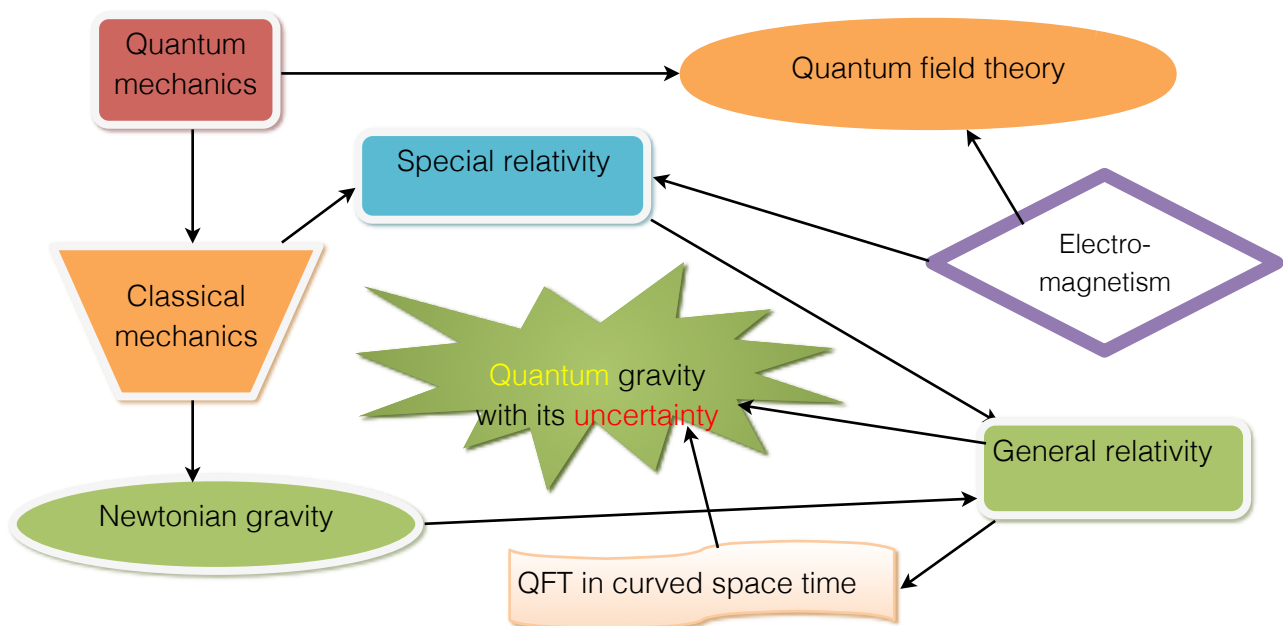


Diagram [1] shows basic physics theories in conjunction with quantum gravity

The formation of black holes can be subdivided into two types, the former being of stellar source and a handful of solar masses, the latter being found in globular clusters and galactic nuclei which are larger, varying from several hundreds to a billion solar masses. When a star with sufficient mass has burnt its nuclear fuel, the star implodes, due to its internal pressure being unable to resist its own gravitational pull. The outer shells are ejected and the star becomes a supernova, which gradually contracts and reaches the equilibrium state of a neutron star. At this point if the resultant neutron star mass exceeds a few solar masses the pressure will cause it to collapse again. This will continue until the formation of a black hole occurs.

Just after the publication of Einstein's general theory of relativity, the German physicist Karl Schwarzschild found that there is a critical radius within the curvature of space time around a point mass, where a singularity transpires. The pivotal radius was named after him. His equation was that for a mass M his radius R_s is given by $R_s = 2GM/c^2$. The clarification of Schwarzschild's equation is that if a body is completely bound by its Schwarzschild radius, a singularity will occur. This is called a black hole.



Above picture taken by the Chandra X-ray Observatory showing a supermassive black hole.

Image credit: NASA <https://www.mnn.com/earth-matters/space/photos/10-incredible-images-of-black-holes/universal-mystery>

The General Theory of Relativity considers that black holes have three specifics, which are angular momentum, mass and charge. What falls into a black hole at that point Hawking considered would be lost, due to his radiation. In the 1990's string theory raised its head and satisfied those analysing data that all information that plummets into a black hole will re-materialise when the black hole vaporises. Hawking then re-evaluated his original theory with the help of several other scientists and considered that black holes can produce very low energy quanta, which they called "soft hair". In 2014 one of the scientists working with Hawking concluded that there are an unlimited number of conservation laws pertaining to gravitons. Extrapolating this idea he found it could be used in electromagnetism as well. Hawking, Perry and Strominger continued with these findings and described electromagnetism using quantum mechanical theory. They calculated that if a photon was added to the black hole horizon, the charge will change. This can occur every time this happens changing charge energy an infinite number of times. These photons and gravitons lurking on the event horizon can grab and store information from black hole bound particles. This resides in the quantum area of the 'soft hairs'. Essentially this means that when a black hole vaporizes, information must exit with the Hawking radiation.

References:

- 1 Credit : Information from https://en.wikipedia.org/wiki/Quantum_gravity#Graviton
- 2 Mathematics https://en.wikibooks.org/wiki/General_Astronomy/Black_Holes/Hawking_Radiation
- 3 https://en.m.wikipedia.org/wiki/Killing_vector_field "the flow generates a symmetry, in the sense that moving each point on an object the same distance in the direction of the Killing vector field will not distort distances on the object."
- 4 https://projecteuclid.org/download/pdf_1/euclid.cmp/1103899181 (Particle Creation by Black Holes :S. W. Hawking Department of Applied and Theoretical Physics, University of Cambridge, Cambridge, England)
- 5 <http://www.dailymail.co.uk/sciencetech/article-3629054/There-way-escape-black-hole-Stephen-Hawking-claims-soft-electric-hair-lets-information-released-abyss.html>
- 6 https://en.wikipedia.org/wiki/Quantum_gravity

Screen display for the Coronado PST (and other 'scopes)

Martin Richmond-Hardy

Introduction

I've recently been playing with some video devices with a view to using them with a telescope, particularly the Coronado PST (Personal Solar Telescope).

At public events we often find that people not used to viewing through a telescope have difficulty in seeing the image. A separate video display would be helpful.

A particular drawback with the PST is that, because of the back focus issue with the telescope, using it with a camera usually entails major surgery/mechanical engineering [1, 2]

Wireless remote camera.

I wanted to display the image on a TV or with a projector and to avoid wires... and be cheap!

Initially with a view to trying amateur TV, I purchased the following kit:

Camera + Transmitter

EACHINE FPV 200-set FOV 110° £14.99, eBay <https://www.ebay.co.uk/itm/222925111770>

This is what is in the box.

Warning: there are higher power transmitters available in the range but have been shown to have performance issues¹ which would attract the attention of Ofcom. Mine is the 200mW version which gives a clean output with the provided stick antenna.

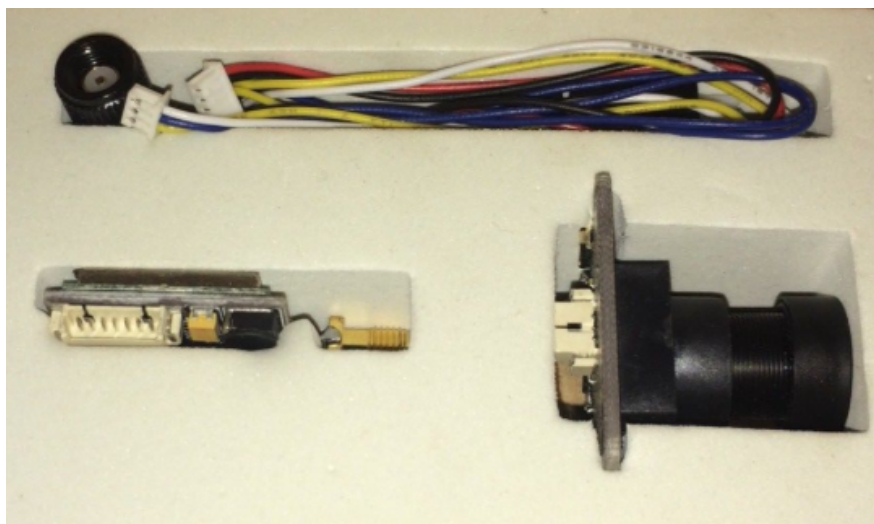
The camera has a 1/4" CMOS device² and is fitted with a 2.8mm/ 115degree wide angle lens (suitable for a meteor-spotting camera?) which is removable. The M12x 0.5mm diameter thread matched the adapter I bought to connect a webcam to a telescope.

This can be used with a Barlow or screw-in focal reducer, depending on your need.

NB the lens unit is fitted with an IR cut filter (judging by the pinkish images when used with a telescope) so it may be necessary to reintroduce such a filter in the adapter.

You can select PAL: 720(H) x 576(V) or NTSC: 720(H) x 487(V).

It is supplied with a power lead (12V) but you will need to replace the small connector with a "cigar" plug, or fit a suitable power socket.



¹ The antenna is not a good impedance match, resulting oscillation at ~430MHz and nasty sidebands in the 5.8GHz output. ILLEGAL!

² FH8510: Low Cost CMOS ISP for CCTV <http://www.fullhan.com/en/uploads/2015/09/230935252182.pdf>



Here is my prototype camera+transmitter unit fitted with a 2.1mm power socket
The transmitter runs quite hot so a metal box may be preferable.

Receiver



The Eachine RC832 Boscam FPV 5.8G 48CH Wireless AV Receiver for RC Drone FPV Racing – £12.29

https://www.banggood.com/Eachine-FPV-5_8G-32CH-Wireless-AV-Receiver-RC832-p-975426.html

It is supplied with a power lead (12V) but you will need to replace the small connector with a “cigar” plug, or use a separate lead with a 1.3mm DC Power Plug (pin diameter 3.5mm).

There are two AV outputs.

Alternative antenna

The transmitter and receiver are fitted with reverse SMA connectors to connect the supplied stick antennas. If you need to use a directional antenna for increased range, then one of these fitted with a right angled pcb-mounted SMA socket plus an SMA-reverse SMA tail is ideal. These can be obtained locally from <http://g4ddk.com/Products.html>



Resulting image

The small chip size (3.2x2.4mm) results in considerable magnification. What you'll get is a "direct image" on the monitor screen, which is more magnification than what is seen in the eyepieces due to the inherent magnification with image sensors and telescopes. While this arrangement is fine for some users, others require an image on the monitor that looks more like the Field Of View, or FOV, that is seen in the telescope. [3]

Camera Chip Size	Suggested Adapter (focal reducer)
1/4"	0.265 or 0.3X
1/3"	0.3X
1/2"	0.45X, 0.5X or 0.6X
1/1.8"	0.45X, 0.5X or 0.6X
2/3"	0.7X

A calculator [4] at http://www.astro.shoregalaxy.com/dslr_calc.htm gives, for a 3.2x2.4mm chip, with resolution 720p, the following magnifications:

Type	Focal length mm	Magnification
S-C	1500	375
Newtonian	1200	300
Refractor	600	150
PST	400	100

PST

Even with a 0.6 focal reducer it was not possible to obtain focus with the PST.

9x50 Finder scope (50x150mm)

Even with a 0.6 focal reducer it was not possible to obtain focus.

Refractor 90x500mm

Focus can be obtained.

The use of a x0.6 focal reducer brought the focus point about 4cm further in and gave a wider field of view.

Bresser Newtonian Reflector 500mm

Focus can be obtained.

Microscope



I obtained this device (<£50) primarily for working with surface mount electronic components.

<https://www.banggood.com/G600-Digital-1-600X-3-6MP-4-3inch-HD-LCD-Display-Microscope-Continuous-Magnifier-Upgrade-Version-p-1152799.html> There's now a cheaper version¹

It comes with a sturdy adjustable alloy stand and magnification is controlled by raising or lowering the electronic unit. Focussing is done using the knob on the front. There is also a ring of white LEDs which can be adjusted in brightness. Turn fully off when using with a telescope, of course!

There is a slot for a micro SD card (not included) to enable you to take stills (jpg) or videos (avi). You can include a date+time stamp on the image. The included power supply/charger has a European plug but any usb power unit will do. The internal rechargeable battery lasts a few hours and there is an auto power-down mode.

The screen (95x56mm) and lens unit are removable. The lens barrel has tapered diameter 33.8 – 34.2 mm – not quite compatible with the standard 31.5mm (1¼") telescope eyepiece so some bodging has to be done.

Enter the 35mm plastic film canister.

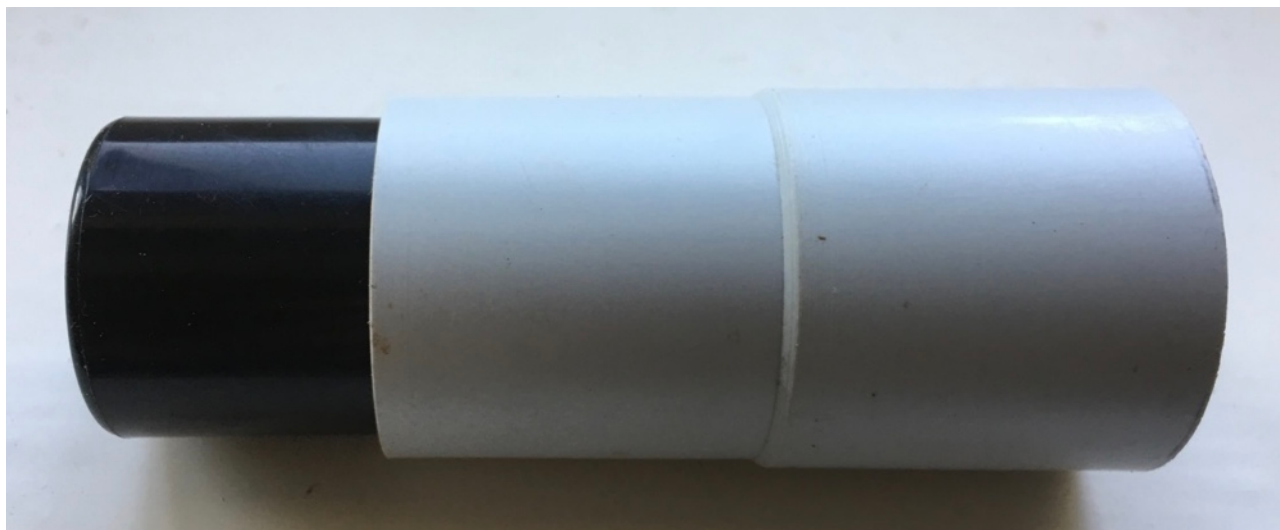
The versions with an internally fitting cap (white opalescent & black) are ideal having an external diameter of 31.2mm and an internal diameter at the opening of 29.7mm (there's a slight internal ridge to grip the internally-fitting top). This makes for a push fit on the end of the microscope.

If you only have version with external cap (30mm internal diameter) you will need the assistance of a bit of gaffer tape.

Alternatively, a plumbing supplier may be able to provide you with a suitable plumbing pipe reducer. I found one in my come-in-handy-some-day box with an internal diameter tapering from 34.5 down to 32mm. This takes a 35mm film canister as a push fit to provide the eyepiece end.



¹ There's now a [cheaper \(£38\) version](#) with a different stand.



Plumbing reducer + film canister adapter.

The longer tube helps reduce magnification and obtain focus.

I'm sure those of you with metal/wood-working skills will be able to turn a suitable adapter.

The PST has an optical aperture of about 6mm. —>

Drill a 25mm (1") hole in the base of your film canister. Remove the dust and swarf and fit to the microscope barrel. If you are using a white canister, line it with a strip of thin black card to exclude light (paint may flake off).or wrap black gaffer tape round it.

NB Don't be tempted to shorten the canister or you won't be able to bring the microscope to focus.

Focus the telescope using an ordinary eyepiece, then remove the eyepiece and insert the modified microscope into your PST or ordinary telescope. Now adjust using the focus knob on the microscope.

I found that the optical path is not quite centred and the microscope has to be slightly tilted. This is where you may need the assistance of gaffer tape!



Diagonals

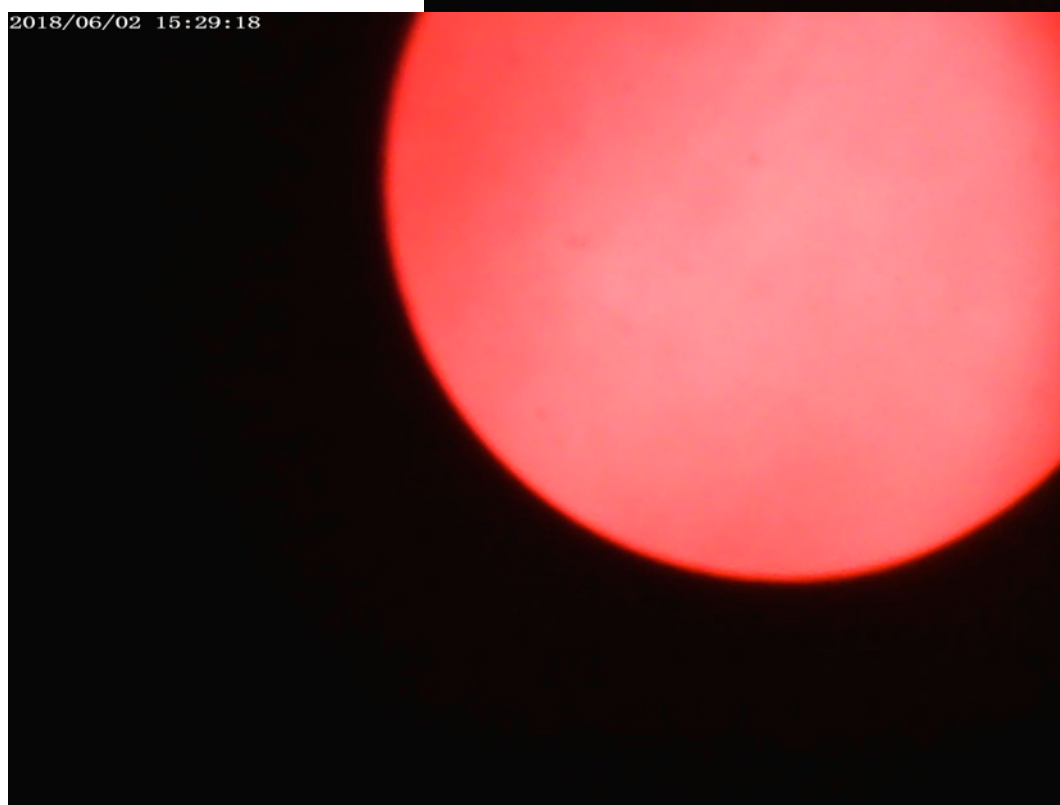
A 90° diagonal will increase the distance from the focus point and thereby reduce the magnification.

Resulting images

Although the screen image is correctly proportioned, the aspect ratio of the saved jpg files have horizontal distortion and require resizing to give a circular sun image.

Some sunspots would have been nice...

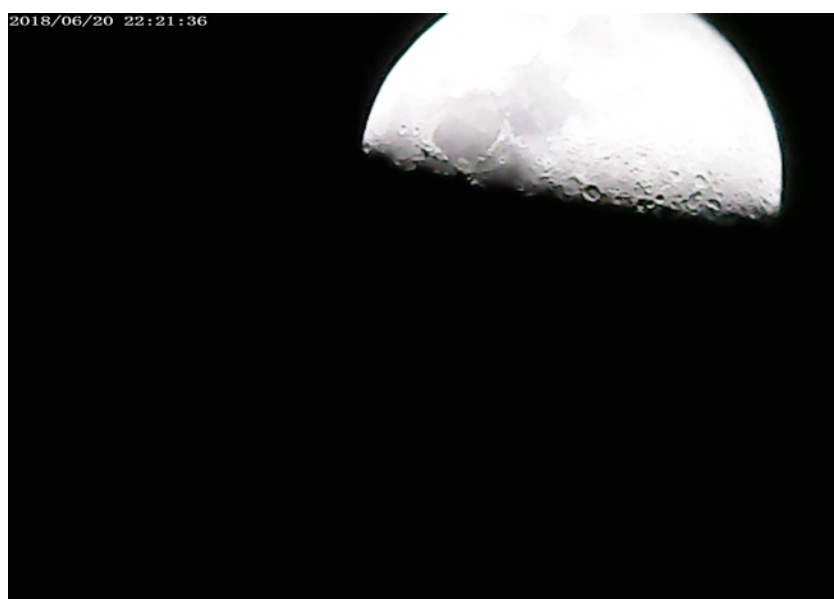
PST



Taken using Andy Gibbs' PST at Kirton Fete 2 June 2018

600mm Newtonian reflector

*Moon taken using my 600mm
Bresser Newtonian.*



9x50 Finder scope (50x150mm)

Useful to avoid twisting your neck. If you have the Skywatcher 9x50 job you'll need a Finder/ Guider Adapter to T thread and a T-thread 35mm extension tube.

Refractor 90x500mm

I used a Vixen flip-mirror. This has a 2" fitting for the scope and two removable 1¼" eyepiece tubes. These, at 50mm, proved to be too long for the wifi camera but I had a 35mm extension tube which fitted and focus was obtained.

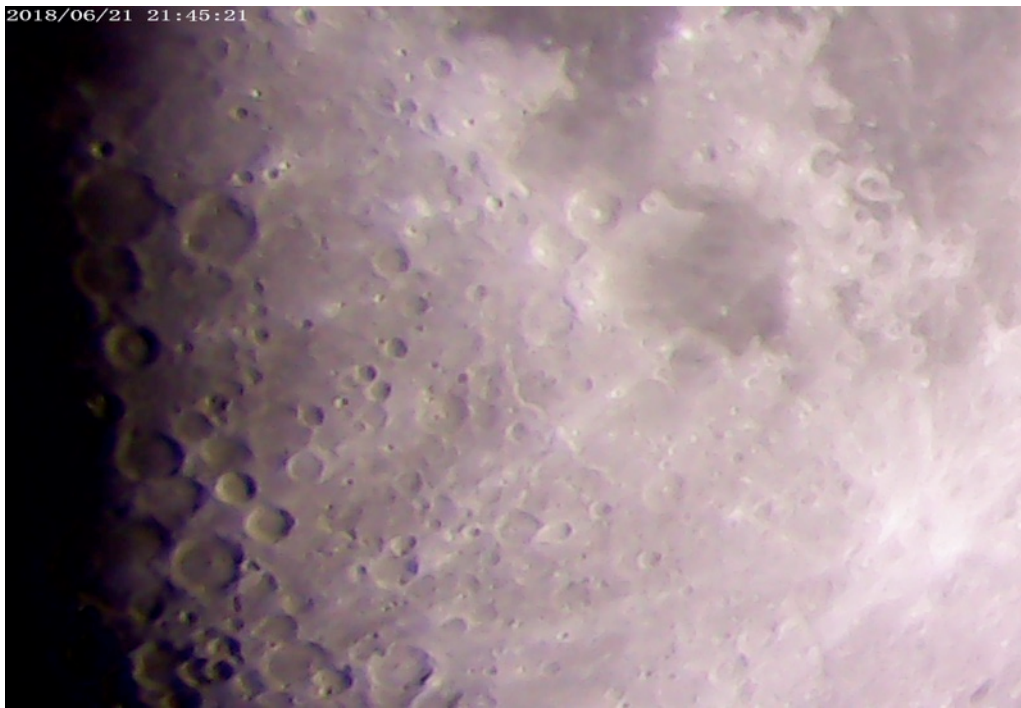


Moon at 18/06/25 20:47 BST at Newbourne. Slight haze.

The next two pictures were taken with just the microscope fitted to the focuser (no flip mirror), resulting in greater magnification.



Moon at 18/06/21 21:46 BST at Kirton.



Moon at 18/06/21 21:45 BST at Kirton



TV image from the wifi camera. Note L-R inversion from the microscope image.



Test set-up with both cameras on the 500mm refractor using a flip mirror, targeted on a distant (~150m) beech tree.

References

1. PST Photography with a DSLR by Keith Ehren
<http://www.astrosoft.co.uk/Articles/PST%20Photography%20with%20a%20DSLR.pdf>
2. Imaging the sun with Coronado PST and ZWO or DSLR camera <https://www.cloudynights.com/topic/535420-imaging-the-sun-with-coronado-pst-and-zwo-or-dslr-camera/>
3. C-MOUNTS, CS MOUNTS AND IMAGE SENSORS <http://meijitechno.com/camera-mounts/>
4. Calculator for DSLR Astrophotography, Ray Shore's Astronomy & Astrophotography site
http://www.astro.shoregalaxy.com/dslr_calc.htm

Appendix 1

Sensor Size Designations Explained

Source: <http://meijitechno.com/camera-mounts/>

Sensor sizes are often designated using fractions such as 1/1.8" or 2/3" which are larger or smaller than the actual sensor diagonal dimension. This sensor size designation goes all the way back to standard sizes given to [Vidicon camera tubes](#) developed in the 1940's and is, unfortunately, still in use today.

Common Image Sensor Sizes

Sensor "Size"	Aspect Ratio	Actual Sensor Dimensions (mm)		
		Diagonal	Width	Height
1/4"	4:3	4.000	3.200	2.400
1/3.6"	4:3	5.000	4.000	3.000
1/3.2"	4:3	5.680	4.536	3.416
1/3"	4:3	6.000	4.800	3.600
1/2.7"	4:3	6.721	5.371	4.035
1/2.5"	4:3	7.182	5.760	4.290
1/2"	4:3	8.000	6.400	4.800
1/1.8"	4:3	8.933	7.176	5.319
1/1.7"	4:3	9.500	7.600	5.700
2/3"	4:3	11.000	8.800	6.600
1"	4:3	16.000	12.800	9.600
4/3"	4:3	22.500	18.000	13.500
1.8" (APS-C)	3:2	28.400	23.700	15.700
35 mm film	3:2	43.300	36.000	24.000

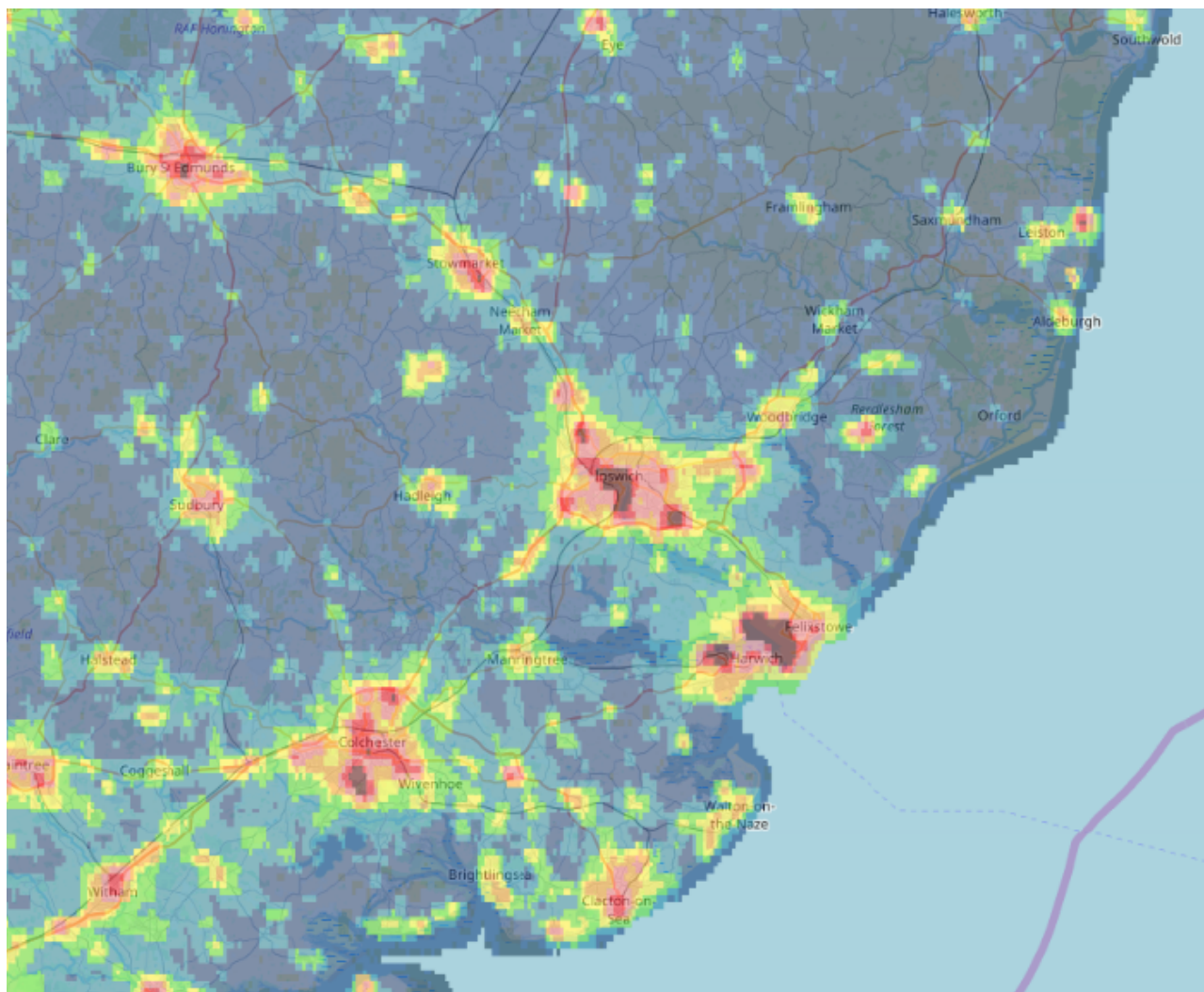
Light pollution

Andy Gibbs

Here's an interactive map of light pollution. <http://www.nightblight.cpre.org.uk>

To go straight to the map [Launch interactive map http://www.nightblight.cpre.org.uk/maps](http://www.nightblight.cpre.org.uk/maps)

This is the result for our area of East Anglia.



European Conference on Amateur Radio Astronomy (EUCARA) EUCARA 2018

<https://astropeiler.de/european-conference-amateur-radio-astronomy-eucara>

The European Conference on Amateur Radio Astronomy has been initiated by the Astropeiler Stockert in 2014. It will now take place for the third time on September 15th to 16th, 2018 at our site near Bad Münstereifel ~30km SW of Bonn

We are looking forward to have visitors from many countries, presenting their work and exchanging views and experiences.

The schedule for the event is:

EUCARA will be a two days conference on the weekend of September 15th and 16th, 2018. The first day will start with a number of presentations by attendants. After lunch we will continue with presentations and then leave by bus for a tour visiting the Effelsberg 100m telescope.

In the evening we will meet for a conference dinner in the scenic city of Bad Münstereifel.

The second day will start with a Key Note Speech by Prof. Michael Kramer, Director of the Max Planck Institute for Radio Astronomy. He is one of the world leading scientist in pulsar research, and he will give an insight into his research area. from the Max-Planck Institute of Radio Astronomy.

The morning session will continue with a number of further paper presentations.

In the afternoon site visits of the Astropeiler facilities will take place with a number of hands on observations with the 25m dish. This will be done in smaller groups. While these groups are on the tour one by one, the other attendants will have the opportunity for poster sessions, face to face discussions and visiting our smaller instruments, a 10m and a 3m dish.

Essential Radio Astronomy

The National Radio Astronomy Observatory has an online course which you can find at

https://www.cv.nrao.edu/course/ast534/ERA_old.shtml

Essential Radio Astronomy (ERA) is a one-semester course intended for astronomy graduate students and advanced undergraduates with backgrounds in astronomy, physics, or engineering. The goal of *ERA* is fostering the community of researchers using radio astronomy by attracting and training the most talented university students. Therefore they are making *ERA* available via the world wide web at no cost.

This page <https://www.cv.nrao.edu/course/ast534/RadioTelescopes.html> shows a number of professional radio telescopes.

OPS Archaeology

Bill Barton FRAS

Below is an image captured at Orwell Park on the evening of 27 June. Does it show evidence of an earlier building nearer the river? Anyone have information?



STOP PRESS! Airy Conference - Cambridge

Paul Whiting FRAS

Bill and I attended the above workshop today at the University of Cambridge Library. All about our friend George Biddell Airy. The first two speakers went on about the effects of place on Airy and his outlook on life. Particularly his early days in Cambridge and his country retreat in Playford. Both the speakers waxed lyrical about the main source of their Suffolk research was via The Orwell Astronomical Society. This was totally unbidden and they didn't know who we were or that we were there anyway! Our name was literally in lights on the screen!

The speakers were Dr Stephen Courtney, a young postdoc from Oxford Uni and Professor Simon Schaffer of Cambridge Uni.

Nice to know that we have been properly credited for our part in their research.

Paul

Chairman's Challenge

Paul Whiting FRAS

How about getting out of that armchair and doing some real astronomy?

Here are some observational tasks that are part of the Astronomy GCSE syllabus. Why not pick one or two and have a go over the next few months? Get the family involved. We will then have a feedback session at Newbourne when you can present your findings, possibly at the annual barbecue.

Some of the tasks may take a bit of research and thought, but they are fairly straight forward. If you get stuck there are enough people around to ask. Sadly I'm not in a position to award a GCSE, but hopefully we should all have some fun and maybe even learn something!

Here are the tasks:

1 easy: Estimating levels of light pollution

Use estimates of the magnitude of the faintest stars visible with the naked eye to conduct a survey of the astronomical effects of light pollution in an area.

1 advanced: Measuring levels of light pollution

Use estimates of the magnitude of the faintest stars visible on photographs to conduct a more detailed survey of the astronomical effects of light pollution in an area.

2 easy: Estimate the solar rotation period using drawings of sunspots

Use a series of drawings from pin hole projections to estimate the length of the Sun's average rotation period.

2 advanced: Determine the solar rotation period using photographs of sunspots

Use a series of photographs or drawings from telescopic projections of sunspots to estimate the length of the Sun's average rotation period.

3: Finding longitude using a shadow stick

Use measurements of shadow length around local noon to estimate the observer's longitude.

4: Demonstrate the range of objects in the Messier Catalogue

Use detailed drawings or photographs of objects from the Messier Catalogue to demonstrate the range of different objects it contains.

5: Calculation of the length of the sidereal day

Use long-exposure photographs of the area around the celestial pole to produce an accurate measurement of the length of the Earth's sidereal period.

Of course you could come up with your own ideas. Only one rule – enjoy yourselves!

Paul

Bring your results to the Summer BBQ!