



OASI News

The newsletter of the Orwell Astronomical Society



Mystery object

Photo by Alan Smith

Trustees: Mr Roy Adams Mr Neil Morley
Honorary President: Dr Allan Chapman D.Phil MA FRAS

Mr David Payne

Contents

Cover picture: Mystery object	
Society Notices	3
Society Contact details	3
Next Committee Meeting	4
OASI and BAA Events	5
OASI @ Newbourne	7
Stargazer's Guide	7
Astronomy Workshops/Informal talks	7
Lecture Meetings	8
Other local astronomy society meetings	8
Atheneum Astro Society	8
LYRA Lowestoft & Yarmouth Regional Astronomers	8
DASH Astro	9
Haw Wood Star Parties.	9
OASI at Bentley Family Day on 8 September.....	10
BAA news	10
BAA meetings in October & November	10
First Edition of the Equipment and Techniques Section News	10
Going with the Flow - Tides and the Deben Estuary	11
The Night Sky in October.....	12
Moon	12
Sun, Moon and planets	12
Paul's Astronomy Podcast for October	12
Occultations during October 2019	13
Meteor showers	13
Visible ISS passes $\geq 15^\circ$ max altitude	14
Astronomy on the radio	14
Perseid Meteors, 2019	15
Aliens over Grundisburgh	24
The Veil Nebula	26
NGC 7635.....	27
In Search of Extrasolar Worlds: A dip of a toe into the main methods.....	28
Radial Velocity	28
Transit Photometry	29
Gravitational Microlensing	29
Pulsar Timing	29
Polarimetry	30
Astrometry	30
Confirmed Exoplanet Statistics	30
References:	31
The Crowd and the Cosmos	31
Gyulbudaghian's Nebula	32
Cataclysmic Variable Stars	32
Using gravity to map the radio emission beams of neutron stars.....	38
Christmas Party 2019	40

Society Notices

Society Contact details

Observatory (meeting nights only)

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.

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

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

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 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 2019

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
	Martin Richmond-Hardy	Newsletter, OASI @ Newbourne
	John Wainwright	Equipment curator
	Mike Whybray	Astronomy Workshops, Child protection officer, Orwell Park School Astronomy Club.
	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 22 November 2019, 8pm at Horley Spiritualist Church, 345 London Rd, Ipswich IP2 0BG

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 (bottom right of the calendar) 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

Key:

OASI public events

BAA events

Other events

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
Sat 5 Oct		<i>BAA Back to Basics workshop</i>
Sat 12 October		<i>BAA Observers' Workshop</i>
Monday 14 Oct from 19:00 Newbourne Village Hall	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI @ Newbourne.
Fri 18 Oct 20:00 St Augustine's Church Hall	Peter Richards lectures@oasi.org.uk	Lecture. "Pulsars and our understanding of the cosmos" Dr Robert Ferdman. University of East Anglia.
October 16 @ 7:00 pm - October 27 @ 7:00 pm The Longshed, Woodbridge	https://www.woodbridgeriverside.co.uk/event/going-with-the-flow-tides-and-the-deben-estuary/	Going with the flow – tides and the Deben estuary' "Time and Tide" Paul Whiting, Orwell Astronomical Society Ipswich will talk about gravity and its effects on tides and time, concentrating on the cause and types of tides, moving on to cover gravity tides in the solar system and galaxies, ending up with black holes and gravity waves 19 October 2pm 22 October 2pm for accompanied children 7-11 "How we got a moon and how we can't live without it" Dan Clery, science writer 20 October 2pm

Date, Time & Location	Contact	Event
Sun 27 Oct Bawdsey Radar Museum	Paul Whiting, FRAS treasurer@oasi.org.uk	Bawdsey Astronomy Day
Monday 28 Oct from 19:00 Newbourne Village Hall	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI @ Newbourne. 19:30 Sky notes 19:45 Workshop: Bill Barton FRAS 'Observing Transits of Mercury' Bookswap
28 Oct-4 Nov		<i>Haw Wood Autumn Star Party</i>
Wed 30 Oct		<i>BAA AGM</i>
Mon 11 Nov		Transit of Mercury. First contact 12:35 UTC
Monday 11 Nov from 19:00 Newbourne Village Hall	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI @ Newbourne.
Fri/Sat 15/16 Nov. Stoneleigh Park, Coventry CV8 2LH	https://www.ukastroshow.com	<i>International Astronomy Show</i>
Fri 15 Nov 20:00 St Augustine's Church Hall	Peter Richards lectures@oasi.org.uk	Lecture. "Neighbours - An Introduction to the Local Group". Dr Nick Hewitt. British Astronomical Association.
Sun 17 Nov, 05:30	James Appleton info@oasi.org.uk	Field trip to observe graze of ZC1128. More info.
Monday 25 Nov from 19:00 Newbourne VH	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI @ Newbourne. 19:30 Sky notes 19:45 Talk: The Christmas star. Paul Whiting Bookswap
Monday 9 Dec from 19:00 Newbourne VH	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI @ Newbourne.
Wed 11 Dec 20:00 Coach and Horses, Melton	r.gooding908@btinternet.com	Christmas Party 2019
Fri 20 Dec 2019, 04:30	James Appleton info@oasi.org.uk	Field trip to observe graze of ZC1840. More info.

Date, Time & Location	Contact	Event
Monday 23 Dec from 19:00 Newbourne VH	Martin Richmond-Hardy newbourne@oasi.org.uk	OASI @ Newbourne. 19:30 Sky notes Bookswap

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).

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 (Sky Notes), Astronomy Workshops and the Book Swap.**

OASI@Newbourne Meetings

14 Oct	28 Oct (S+W+B)	11 Nov	25 Nov (S+W+B)
9 Dec	23 Dec (S+B)		

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).

Stargazer's Guide

On the last meeting each month Bill Barton FRAS will give a short presentation of what can be viewed in the following 4 weeks plus a reminder of OASI events.

Astronomy Workshops/Informal talks

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.

28 October Bill Barton FRAS, Observing Transits of Mercury

25 November Paul Whiting FRAS, The Christmas Star, 2019

Paul Whiting, Bill Barton, James Appleton and Andy Gibbs offered to lead workshops as follows:

- Paul: *3000 Years of Eclipses Visible from Orwell Park Observatory*, date TBA.
- Paul: *Wartime Astronomy*, date TBA.
- Paul: *Galaxy Collisions*, date TBA.
- Bill: *Celestial Coordinates*, date TBA. New members at Newbourne have requested this workshop; Bill is willing to lead it but will defer if anyone else would rather do so.
- James: *Update on OASI All-Sky Meteor Cameras*, date TBA.
- Andy: *Frances "Poppy" Northcutt (former NASA flight controller)*, date TBA.

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

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

- | | |
|---------------|---|
| 18th October | "Pulsars and our understanding of the cosmos" Dr Robert Ferdman.
University of East Anglia. |
| 15th November | "Neighbours - An Introduction to the Local Group". Dr Nick Hewitt. British
Astronomical Association. |

Other local astronomy society meetings

Athaneum Astro Society

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>

LYRA Lowestoft & Yarmouth Regional Astronomers

www.lyra-astro.co.uk

LYRA Programme and Local Events 2019 – 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

- | | |
|--------|---|
| Oct 8 | A Talk "Variable Stars – being a Professional-Amateur" by Michael Poxon |
| Oct 22 | LYRA Observing/Practical night at Barn Car Park, Parkhill Hotel from 7:30pm |
| Nov 12 | TBA |
| Nov 26 | LYRA Observing/Practical night at Barn Car Park, Parkhill Hotel from 7:30pm |

DASH Astro

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

Meetings are 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.

Note these meetings are now on Sundays.

- Oct 13 Meeting – Dr. Manda Banerji, Inst. of Astronomy, Cambridge Univ.
- Oct 23&24 Family Stargazing Evening at Sutton Hoo N.T. Site 6-9pm
- Oct 27 Dash Observing Session (Sunset 16:33, Moonset 16.46, 0.9% Moon)
- Nov 10 Meeting – Steve Hubbard, Ian Lomas & David Gwynn, plus “Q & A Panel” Title TBC
- Nov 11 DASH Observing. “Transit of Mercury” start 12:35 ends 16:06 (sunset)
- Nov 24 Dash Observing Session (Sunset 15:49, Moonset 15.10, 6.7% Moon)
- Dec 07(Saturday) DASH Christmas Social – confirmed. (Members and Guests only)

Haw Wood Star Parties.

David Murton (DASH Astronomical Society)

The star parties are held twice a year in spring and autumn, at the Haw Wood caravan and camping site at Hinton, near Darsham in North Suffolk, situated between the A12 main road and the coast. This is a really dark site with SQM readings of 21.70 and naked eye visibility of Magnitude 6.0 achieved on very good nights. It is also a listed “Dark Sky Discovery” site. The managers Dan and Georgina go to great lengths to accommodate us, restricting access to those aware of the lighting policy, switching off the site lighting and arranging for a special reduced site fee for participants.

The events last from Monday to Monday although people can stay for as long as they wish. Since they were first held a few years ago they have attracted a loyal following of people, both serious and casual, visual observers and imagers and great efforts are made to locate them in different areas of the site to avoid any issues with lights.

This year’s autumn party is over the period 28th October to 4th November. We intend introducing some new elements to enhance people’s enjoyment, especially in the event of inclement weather. These include:

- A communal BBQ on the Saturday afternoon (bring your own food for the barby)
- Talks on astronomical topics suitable for all.
- A “pub quiz”
- Fish and chips supper available on the Friday evening.
- Hearty breakfasts available on the Saturday and Sunday mornings with extended hours for all the late risers after observing all night!
- A guided tour of the night sky on the Saturday evening.

If you haven’t been along before, I urge you to do so. These are always friendly events with the added bonus of being on a great site with first class facilities, while the surrounding area comprises the Suffolk Coast and Heaths AONB with Minsmere nearby for the birdwatchers. There is easy access via the A12 and its only 90 minutes from the M25.

Bookings can be made directly to the site by phone or email only, as the normal automated booking system will not be used so as to ensure that everyone is aware of the lighting policy.

Pitches are just £12 per night and booking via 01502 359550 or info@hawwoodfarm.co.uk

www.hawwoodfarm.co.uk

www.dash-astro.co.uk

OASI at Bentley Family Day on 8 September



Photo by Bill Barton

BAA news

BAA meetings in October & November

Saturday, 12 October	Observers' Workshop - Solar, Aurora & NLC, and Deep Sky
Saturday, 26 October	Back to Basics Workshop, Rickmansworth
Wednesday, 30 October	BAA Annual General Meeting and BAA Meeting

First Edition of the Equipment and Techniques Section News

Section Director, David Arditti has just launched the first edition of the [E&T Section News](#). Packed with practical know how for the beginner and the veteran, it makes for a really good read, and is nicely illustrated with diagrams, plenty of pictures, and clear explanations ranging from how to manage the orientation of images and the use of erecting prisms, to building a Network Time Protocol Stratum 1 Time Server using a GPS source and an Arduino Mega 2560 micro-controller.

Anyone who wishes to be put on the E&T Section mailing list or to contribute can email David directly at eandt@britastro.org

Other Section Newsletters now available on the BAA Website:

[Historical Section Newsletter Issue 19](#) has just been published on the BAA Website. It includes a fascinating history of Elizabeth Brown, a founder member of the BAA, who built two observatories, was an eclipse chaser and became Director of the Solar Section.

[Variable Star Section Circular 181](#) has also just been released on line. By the way, a reminder of the [Campaign to observe the old nova HR Lyr](#). The longer nights in September provide a good opportunity for long photometry runs over several hours. For those of you only getting into variable star observing Roger Pickard has published an excellent tutorial, '[An Introduction to Variable Star Observing](#)', just last month.

Going with the Flow - Tides and the Deben Estuary

"Seas the Power" Talk by William Thomson Founder of Tidal Compass and author/illustrator of the World of Tides and the Book of Tides Tickets £6

16 October 7pm John Gibbins Gallery in the Longshed

EXHIBITION AND ACTIVITIES FOR ALL AGES

19 October - 27 October 10am - 4pm in the Longshed free entry

Astronomy, Tidal Energy, Birds of the Deben, Nautical Corner "All at Sea, and what's the tide doing?", the Changing Deben Estuary, Historical access and Access Now, What happens when the tide comes in , How far can you row?

Talks in the Longshed - reserve free tickets

"Time and Tide" Paul Whiting, Orwell Astronomical Society Ipswich

19 October 2pm

22 October 2pm for accompanied children 7-11

"How we got a moon and how we can't live without it" Dan Clery, science writer

20 October 2pm

"Working with the tide" Meredith Scanlon, hydrographer Harwich Haven Authority

21 October 2pm

"Tidal Tales" Justine de Mierre, storyteller

23 October 11am for accompanied children under 5

23 October 2pm for accompanied children 5-11

24 October 11am for accompanied children 5-11

"Why the Deben is special for birds" Paul Hetherington RSPB

25 October 2pm

"Imagining and managing the Deben Estuary into the Future"

27 October 7pm in the Woodbridge Community Hall

Expert speakers, Q&A with panel. Tickets £6 including refreshments

TICKETS FOR ALL EVENTS AVAILABLE FROM 1 SEPTEMBER

Book online www.woodbridgeriversidetrust.org/event or 'phone 07596 870150

The Night Sky in October

Martin RH

BST ends at 02:00 on Sunday 27 October.

All event times (**BST** until 26 October or otherwise stated) are for the location of Orwell Park Observatory 52.0096°N, 1.2305°E



Moon

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

New Moon

1st Quarter

Full Moon

Last Quarter

05 October 17:47

13 October 22:08

21 October 13:39

28 October 03:39 (UTC)

Sun, Moon and planets

Source: <http://heavens-above.com/PlanetSummary.aspx> Times for 31 Oct are GMT (UTC).

Object	Date	Rise	Set	Mag.	Notes
Sun	1	06:55	18:33		
	31	06:48	16:29		
Moon	1	10:13	20:15		
	31	10:41	18:51		
Mercury	1	08:53	18:54	-0.2	Aphelion Oct-03 Max eastern elongation 20 Oct
	31	09:02	16:48	0.5	
Venus	1	08:10	18:55	-3.8	
	31	08:51	17:09	-3.8	
Mars	1	06:01	18:18	1.8	
	31	04:54	15:51	1.8	
Jupiter	1	13:32	21:13	-1.9	3 Oct just to left of the crescent Moon, low in the south after sunset.
	31	10:59	18:34	-1.8	
Saturn	1	15:23	23:05	0.5	5 Oct next to 1st Quarter Moon down in the south.
	31	12:30	20:14	0.6	
Uranus	1	19:20	09:37	5.7	Opposition 28 Oct
	31	16:19	06:32	5.7	
Neptune	1	17:59	04:56	7.8	
	31	15:00	01:55	7.8	

Paul's Astronomy Podcast for October

Paul Whiting FRAS Podcast, October 2019 www.oasi.org.uk/2019_10_pod.mp3

Occultations during October 2019

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.

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
08 Oct	22:32:27	D	0.79+	-42	14	7.2	H106741
09 Oct	21:09:30	D	0.86+	-35	23	7.0	ZC3284
19 Oct	00:25:08	D	0.75-	-47	41	3.0	123 Tau, ζ Tau
	01:15:02	R		-44	48		
22 Oct	00:36:14	D	0.44-	-47	17	5.3	33 Cnc, η Cnc
	01:32:36	R		-43	26		

On 19 October at 04:27 UT there is a northern limit graze of the magnitude 8.4 star T1310-1231-1. It is followed two days later, at 00:05 UT on 21 October, by another northern limit graze, this time of the magnitude 8.3 star H36573. Details are on the OASI website:

http://www.oasi.org.uk/Occs/Occ_summary_2019.php

An observing trip will be organised if weather conditions are favourable; contact Alan Smith or James Appleton if you are interested in participating.

Meteor showers

Source: BAA Handbook 2019 p100-101

Shower	Maximum	Normal limits	ZHR at Max	Notes
October Camelopardalids	Oct 9	Oct 5-6	5	Significant activity reported in 2005 and 2006, outburst in 2016. Favourable .
Draconids	Oct 8	Oct 6-10	25	Periodic shower connected with 21P/Giacobini-Zinner. Weak activity expected. Unfavourable .
Orionids	Oct 22-23	Oct 2 - Nov 7	20	Fast meteors, many with persistent trains. Flat maximum, with several sub-peaks. Good in 2007. Quite favourable .
Northern Taurids	Nov 12	Oct 20 - Dec 10	5	Northern branch of the Taurid complex. Slow meteors. Unfavourable .

For radio observation, use reflections from Graves radar on 143.050MHz or the Brams transmitter in Belgium on 49.97MHz,

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

Martin RH

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

Times are UTC. Predictions are approximate (27 Aug) 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.
1-Oct	-3.8	19:33	10°	W	19:36	82°	S	22 Sep	18°	E
1-Oct	-1.8	21:09	10°	W	21:11	26°	WSW	22 Sep	26°	WSW
2-Oct	-3.3	20:21	10°	W	20:24	49°	SSW	22 Sep	44°	S
3-Oct	-3.5	19:32	10°	W	19:36	62°	SSW	22 Sep	18°	ESE
3-Oct	-1.3	21:09	10°	W	21:11	17°	WSW	22 Sep	17°	WSW
4-Oct	-2.3	20:21	10°	W	20:23	28°	SSW	22 Sep	26°	S
5-Oct	-2.7	19:32	10°	W	19:35	38°	SSW	22 Sep	14°	SE
6-Oct	-1.3	20:21	10°	WSW	20:23	15°	SW	22 Sep	13°	SSW
7-Oct	-1.6	19:32	10°	W	19:34	21°	SW	22 Sep	10°	SSE
9-Oct	-0.7	19:33	10°	WSW	19:33	11°	SW	22 Sep	10°	SSW
10-Oct	-0.9	18:43	10°	WSW	18:45	16°	SW	22 Sep	10°	S
25-Oct	-0.9	06:33	10°	S	06:35	17°	SE	22 Sep	10°	E
26-Oct	-0.7	05:45	10°	SSE	05:47	11°	SE	22 Sep	10°	ESE
27-Oct	-2	05:31	10°	SW	05:34	30°	SSE	22 Sep	10°	E
28-Oct	-1.6	04:43	15°	S	04:45	22°	SE	22 Sep	10°	E
29-Oct	-1.1	03:57	15°	SE	03:57	15°	SE	22 Sep	10°	ESE
29-Oct	-3.1	05:30	13°	SW	05:33	52°	SSE	22 Sep	10°	E
30-Oct	-2.7	04:43	33°	S	04:44	39°	SSE	22 Sep	10°	E
31-Oct	-1.4	03:57	22°	ESE	03:57	22°	ESE	22 Sep	10°	E
31-Oct	-3.7	05:29	19°	WSW	05:32	75°	S	22 Sep	10°	E

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>

Perseid Meteors, 2019

James Appleton

The *BAA Handbook* gives the following predictions for the annual Perseid meteor shower in 2019:

- Range: 17 July – 24 August.
- Peak: 07:00 UT on 13 August.
- Peak ZHR¹: 140.0.

Unfortunately, weather throughout much of the range of the shower was not favourable, with many grey days and cloudy nights. The Moon too presented difficulties, appearing full only two days after the peak. Nevertheless, the “all sky” 2 cameras run by Alan Smith and James Appleton managed to record a total of seven Perseid meteors (no sporadics were recorded during the period). Table 1 summarises the parameters of the cameras:

	Alan	James
Camera	Canon 1100D	ZWO ASI178MC
Lens	Sigma 4.5mm fisheye	ZWO fisheye
Exposure	In the range 57 - 76 s	20 s
ISO / gain	ISO 800	Gain 200 (max)

Table 1. Parameters of cameras.

Table 2 summarises details of the seven meteors. In the table, event times are estimated as the mid-point of the relevant exposure from James’s camera. James’s camera ran with 20s exposures, generally approximately one-third that of Alan’s, so provides the better timing reference.

Figures 1-13 show the images recorded by the cameras, cropped around the meteor trail and background starfield. Varying degrees of contrast stretch have been applied to the images to improve the visibility of background stars. The images of each pair have been aligned as far as is practical, but the two fisheye lenses introduce very different distortions to image scale, so alignment is far from perfect. The fisheye lens used at present in James’s camera is a rather cheap and nasty affair (plans are afoot to obtain a better one!) which suffers from chromatic aberration: this is manifest as a white/blue ghost trail in images 2, 6, 8 and 11. Under extreme conditions, Alan’s lens too can disappoint, and figure 7 shows a red ghost flare corresponding to the bright terminal flare of the meteor.

¹ The Zenithal Hourly Rate is the expected hourly rate of meteors for a single experienced observer under a clear sky, with limiting magnitude 6.5, with the shower radiant at the zenith.

² Inverted commas are used because, due to local horizon features, the cameras, particularly James’s, cover significantly less than 100% of the northern hemisphere.

Time (UT)	Meteor Trail
08 Aug, 02:01:38	N→S through Aries. Colour transitions, two small flares en route and a prominent terminal flare. Figures 1, 2. Triangulated.
10 Aug, 23:33:48	E→W through Draco, terminating in the head of the constellation. Colour transitions, a small flare en route and a slightly brighter flare near the end of the trail. Partially obscured by the TV aerial on James's house! Figure 3, 4. Not triangulated.
11 Aug, 01:45:39	E→W through Draco. Colour transitions, two bright flares towards the end of the trail, after the second of which, the trail becomes much fainter. Only partially visible at the N edge of the image from James's camera. The bright skyglow on the SW horizon is caused by the Moon. Figures 5, 6. Not triangulated.
11 Aug 02:03:19	NE→SW through Sagitta A small flare en route and a bright terminal flare. Skyglow associated with the Moon has largely disappeared by the time of this meteor. Figures 7, 8. Triangulated.
13 Aug, 03:02:29	NE→SW through southern Pegasus. Several changes in intensity, two flares en route and a terminal flare. The central part of James's image, to the E of the trail, is obscured by dew which formed on the acrylic dome protecting the camera: the image was taken before dew heaters were operational. Unfortunately, Alan's camera terminated its observing run, due to impending dawn, at 02:52 UT, just 10 minutes before the meteor! Figure 9. Not triangulated.
13 Aug, 21:53:28	Fireball through Hercules into Ophiuchus. Several terminal flares. The intense glow on the Southern horizon is due to a nearly full Moon. Streetlights are still illuminated and also contribute to the general sky-glow. The meteor trail passed very close to Ipswich, contributing to its apparent brightness. Figures 10, 11. Triangulated.
13 Aug, 23:31:40	Fireball N→S through Pisces. Large variation in brightness. In the image from James's camera, the dot at the end of the trail is the star 20 Piscium, not a terminal flare. The star is lost in the haze in Alan's image. Figures 12, 13. Triangulated.

Table 2. Details of Perseids recorded.



Figure 1. Alan. 08 August, 02:01:38.



Figure 2. James. 08 August, 02:01:38.



Figure 3. Alan. 10 August, 23:33:48.

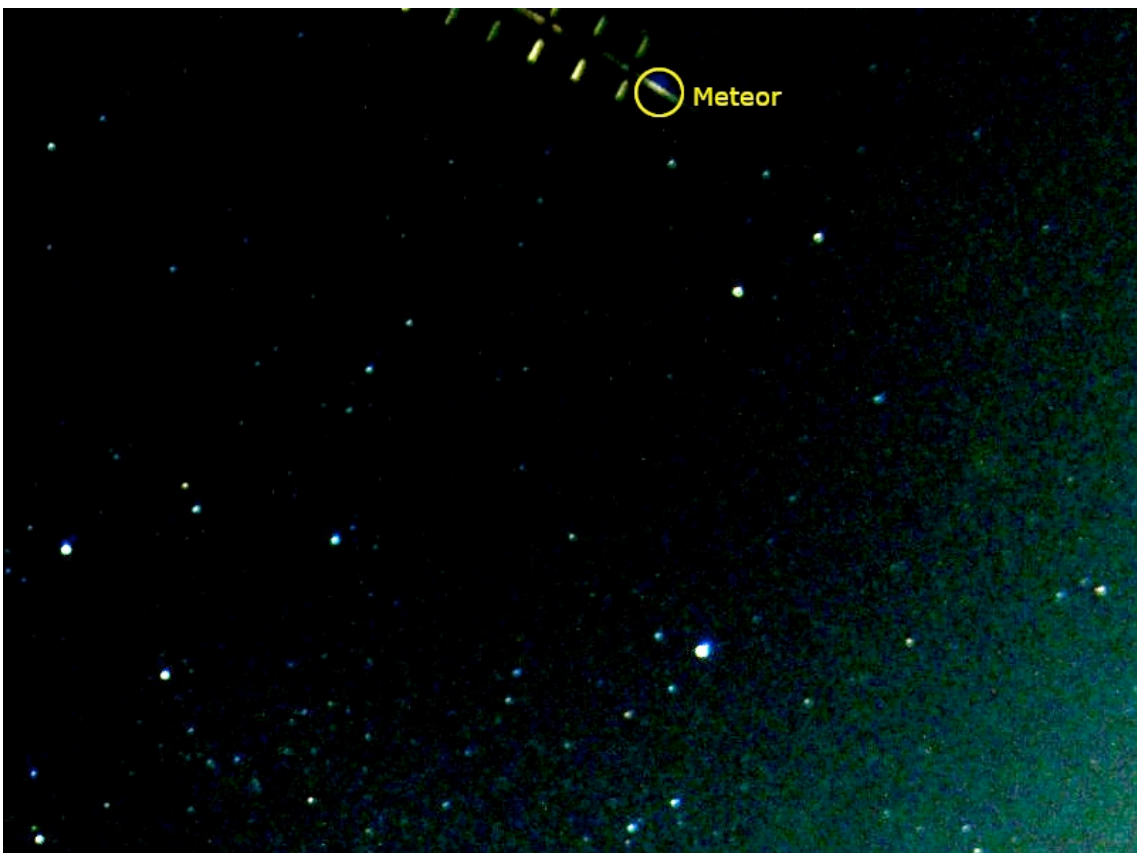


Figure 4. James. 10 August, 23:33:48.



Figure 5. Alan. 11 August, 01:45:39.

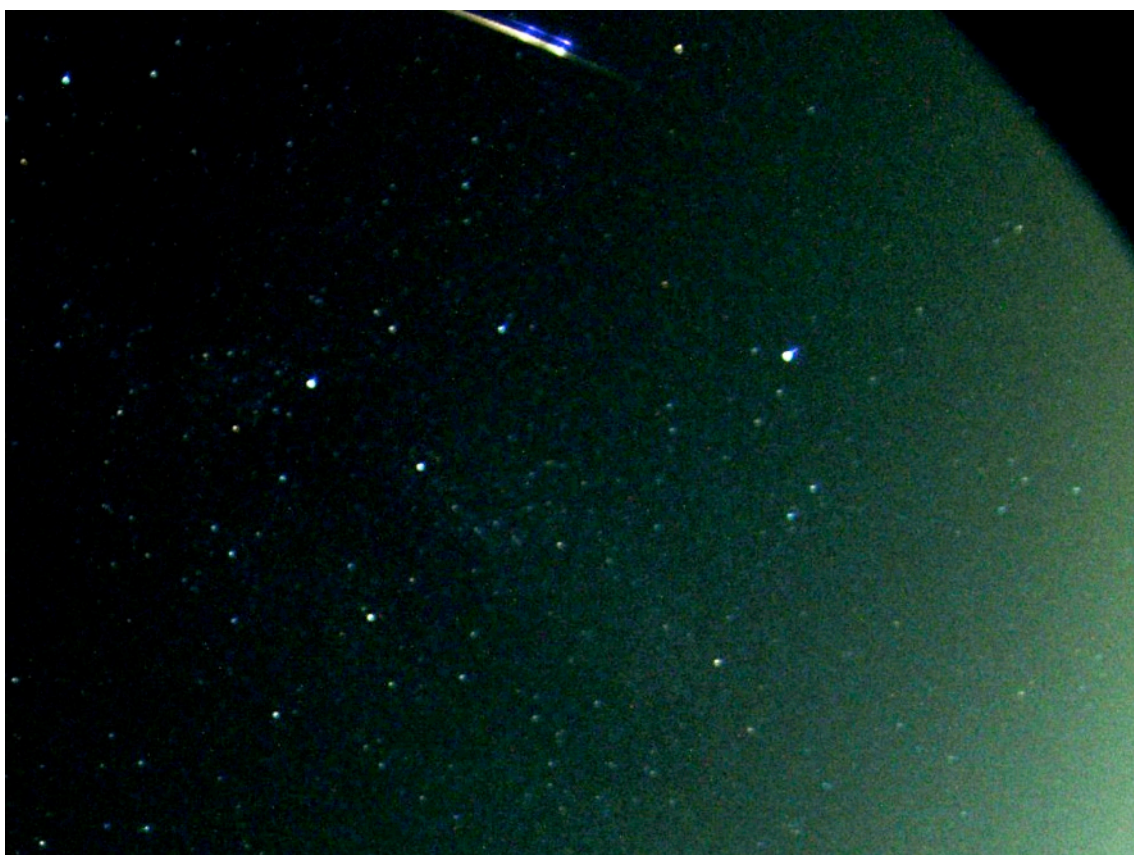


Figure 6. James. 11 August, 01:45:39.



Figure 7. Alan. 11 August, 02:03:19.



Figure 8. James. 11 August, 02:03:19.



Figure 9. James. 13 August, 03:02:29.



Figure 10. Alan. 13 August, 21:53:28.



Figure 11. James. 13 August, 21:53:28.



Figure 12. Alan. 13 August, 23:31:40.



Figure 13. James. 13 August, 23:31:40.

For the four meteors for which both cameras recorded a good image, James triangulated the tracks, using the approach summarised in the February 2019 Newsletter. Figure 14 shows the estimated meteor tracks and altitudes plotted in Google Earth. The tracks are:

- 08 August, 02:01:38 – yellow,
- 11 August, 02:03:19 – green,
- 13 August, 21:53:28 – blue,
- 13 August, 23:31:40 – red.



Figure 14. Meteor tracks relative to terrestrial locations.

**James Appleton,
31 August 2019**

Aliens over Grundisburgh

Alan Smith

I have been operating an all-sky camera off and on for past 40 years. In the early days it was an electromechanically operated film camera, but now it is a fully computerised digital camera.

Over the years, a number of weird and wonderful images have appeared with one notable omission: I didn't manage to image to 'UFO' landing at Rendlesham early on the morning of boxing day 1980 as I had gone to bed and switched the camera off!

During the modern era, on each clear night I set the camera on the shed roof and start the shutter sequence to take around 300 images of around 1 minute exposure each in the hope that a bright meteor or fireball will flash across the field of view. So far, a number of such images have been captured including several that have also been seen across the UK and further into Europe, along with multiple frames of spy satellites, aircraft and noctilucent clouds (no aurorae yet).

Obviously, each of the nightly 300 or so images has to be individually checked to see if anything is visible. This is a fairly tedious business as each frame shown on the PC monitor has to be carefully scrutinised.

Imaging my surprise when, after downloading the files from the 18th July 2019, the following image flashes on the screen:



Just look at those enormous claws and horns silhouetted against the moonlit cloudy sky with Andromeda just visible at the top of the image. (In Greek mythology, Andromeda was chained to a rock by Poseidon to be devoured by a monster.)

Once I had recovered my composure, and fortunately before I had started to construct an alien-proof bunker, I thought some image manipulation might reveal more detail.



What a hoot!

It is a tawny owl that has decided to roost on the camera 'dome' (perhaps attracted by the warmth generated by the dew heaters).

The talons can be clearly seen along with the owls' breast plumage. Its head is just visible at the top right of the body. I guess that this would be the last image an unfortunate mouse might see!

Some of you image M97, the 'Owl' planetary nebula, I just do the real thing!

Alan Smith

The Veil Nebula

John Hughes

One of my favourite night sky objects is the Veil Nebula which is also featured in the September 2019 Sky at Night magazine.

Over the August Bank holiday weekend I spent some time imaging the Western Veil, NGC 6960, using the Baader narrowband filters Ha 7nm and Oiii 8.5nm. The attached image has been processed in the bi-colour palette HOO, assigning Ha to the Red Channel and Oiii to the Green and Blue channel to create a single colour image.

Ha and Oiii light frames totalled 16 and 20 respectively at 300 seconds using the William Optics Z103 telescope, ZWO ASI1600mm Pro Cooled camera set at a gain of 139 and temperature of -15c and mounted on the HEQ6R Pro Skywatcher mount. Overall integration time was 3 hours and processed using the PixInsight software.



NGC 7635

John Hughes



This image represents my interpretation of NGC 7635 in the Hubble Palette and has been framed to also capture M52 an open star cluster. Both targets are located in the constellation of Cassiopeia.

NGC 7635 is an interesting object. The bubble is created by the stellar wind from a massive hot young star SAO 20575 (believed to be a Wolf-Rayet star) which then excites the gas cloud causing it to glow.

The acquisition details are as follows;

William Optics Z103ED scope with guiding provided by the William Optics 50mm guidescope and ASI290mm- mini guide camera.

Imaged with the ZWO ASI1600mm Pro cooled camera using Baader 1.25" narrowband filters - Ha 7nm, Oiii 8.5nm and Sii 8nm. Acquisition software was Astrophotography Tool and guidance provided by PHD2.

Sub frames all taken at a gain of 139 and offset of 50. All 5 minute exposures;

Ha x 41 Oiii x 35 Sii x 40

Total integration time 9.6 hours and processed using PixInsight.

Backfocus remains an issue causing stars at the corners to be elongated though I am gradually getting there with modest adjustments each time I image.

In Search of Extrasolar Worlds: A dip of a toe into the main methods

An article from the library compiled by Andy Willshire

An exoplanet is one that orbits its star situated beyond the Solar system. We can go back as far as 1917 when the first exoplanet was noted, but not confirmed by scientific investigation. In 1992 confirmation was announced of PSRB1257+12 which was an amalgam of terrestrial type planets situated in the vicinity of a millisecond pulsar. A pulsar is a greatly magnetized spinning neutron star. Whilst it spins, it emits a stream of electromagnetic radiation, which can only be seen by Earth when the stream is pointing directly towards it. The first exoplanet rotating around a main sequence star was confirmed in 1995. This was known as 51 Pegasi b, and is a gas giant with an orbit of 4.2 days. It is half the mass of Jupiter, and rotates in such a

way that one of its sides always faces its star i.e. it is tidally locked.

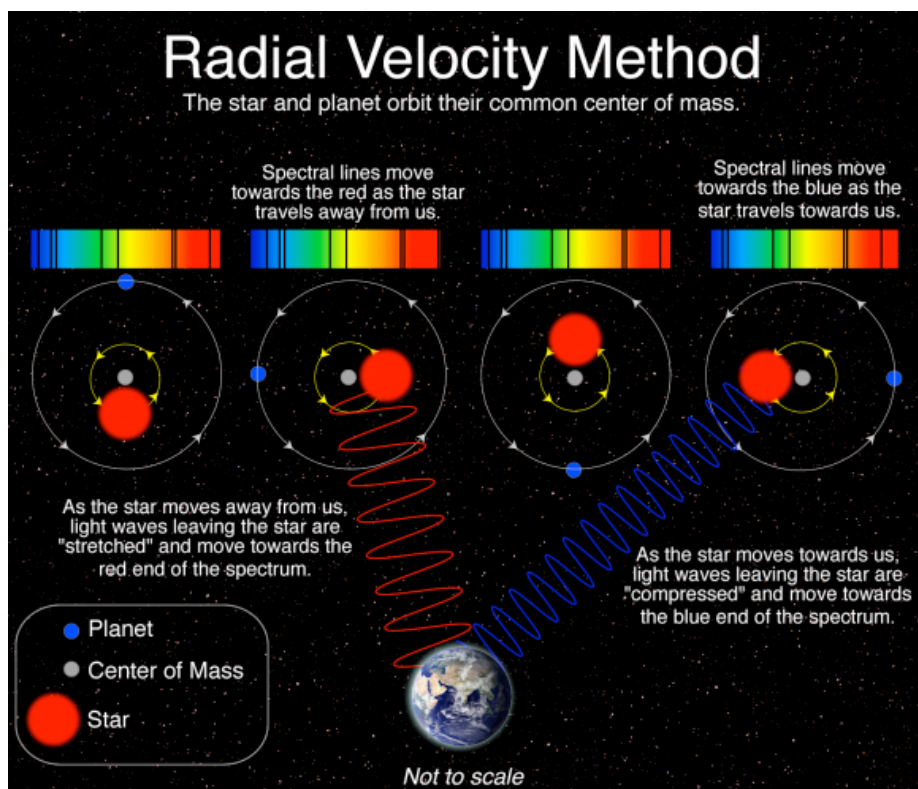
NASA's Kepler spacecraft lifted off 6th March 2006 from Canaveral Air Force station complex 17-B. It was designed specifically to look into our Milky Way galaxy for Earth-sized and smaller planets orbiting their own suns. The launch vehicle was an Alliance Delta II rocket.

At present there are, according to NASA, approximately 3,970 confirmed planets.

A vast number of all confirmed exoplanets have been uncovered by using indirect methods.

Radial Velocity

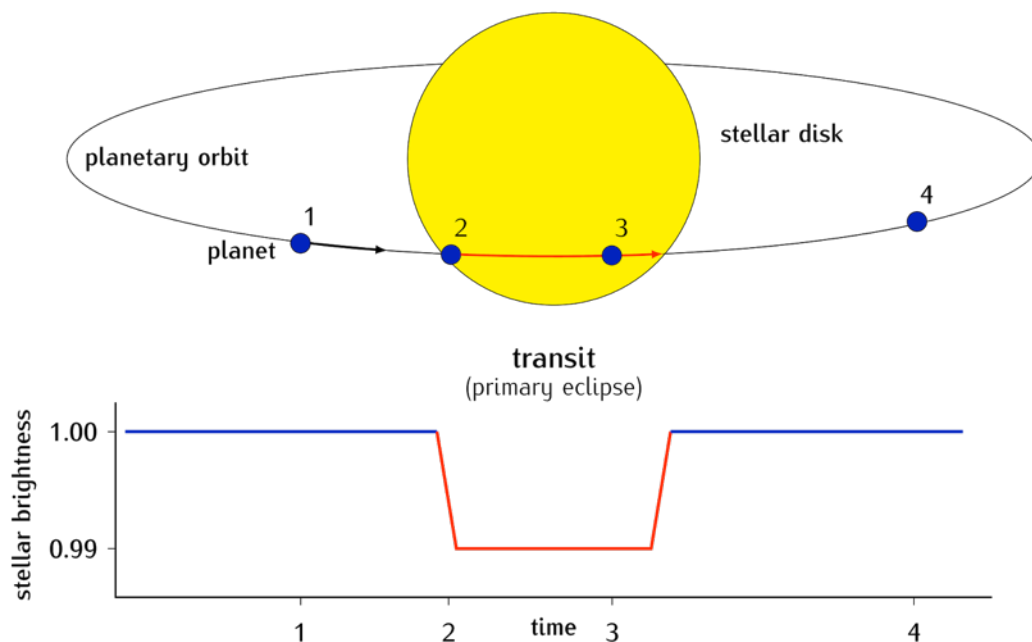
The first of these is the **Radial Velocity** method. When a planet orbits a star, it causes, due to gravity, the star to wobble a little. This movement can be perceived by spectrometry on Earth, as a change in the star's spectral lines, due to the Doppler effect. If the star moves away from Earth it is described as redshift and if moving toward Earth it is described as blueshift, or towards the blue end of the spectrum. Using Doppler spectroscopy and the calculation of the stars velocity, the existence of planets can be deduced. Large planets are best detected using this method as long as the star is close by. However one of the main drawbacks of using this method is that only the minimum mass can be approximated making it difficult to separate low mass stars from planets. Used for observations up to 100 light years from Earth.



Picture credit: Las Cumbres Observatory: Goleta. California

Transit Photometry

Our second investigation is known as the **Transit Photometry**. This means that when a terrestrial type planet crosses, or transits in front of its parent star, as observed by a viewer, a tiny change in the star's brightness will be noted. The drop in brightness can be between 0.01% to 1% of the star's brightness. If the data obtained from this system are identical in periodicity and brightness reduction, it provides a powerful, substantiated method for observation. The main disadvantage of this method is the planet in question must travel without deviation between its star and Earth. Used for observations hundreds of light years from Earth.



Picture credit: <http://exoplanet-diagrams.blogspot.com/2015/07/the-transit-method.html>

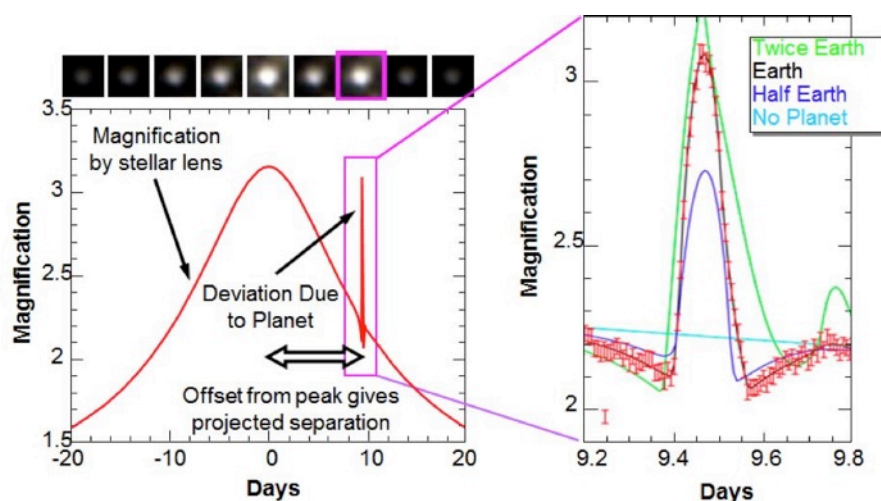
Gravitational Microlensing

This is an indirect method of exoplanet detection. Gravitational forces on distant objects bend light from a star. A massive object which is defined as the lens will bend the light of a brilliant background source. This can create several distorted images which can also appear brighter. The alignment needed to allow microlensing has to be precise and therefore difficult to engineer. It is usually found in astronomical surveys simply because of the numbers of sources investigated. This astronomical effect was forecast by Einstein's General Theory of relativity, which determined if light coming from one star travels very close to another star on its way to a viewer on Earth, the gravity generated by the other star will slightly contort the light rays from the primary star, causing both stars to register a greater distance apart than they normally would be.

Pulsar Timing

Pulsar timing was used to detect the first confirmed exoplanet, in 1992. 6.2ms : PSR1257+12 (Aleksander Wolszczan:Dale Frail). Stars greater than ten times more massive than our Sun can end their life as neutron stars. Some of these may end in a group recognized as pulsars. These display a very regular electromagnetic radiation emission that we are able to detect with each rotation. If regular fluctuations occur in the timing of these pulsars, it may suggest that it is rotating around the centre of mass of a structure with one or several planets. Scientists can conclude by measuring the fluctuations in the timing of pulsars the orbit and mass of these planets.

Time-series photometry is combined to uncover light curves of background source stars being lensed by foreground stars in the disk and bulge.



Planets are revealed as short-duration deviations from the smooth, symmetric magnification of the source due to the primary star.

Detailed fitting to the photometry yields the parameters of the detected planets.

Picture credits: https://wfirst.gsfc.nasa.gov/exoplanets_microlensing.html

Polarimetry

When we look at a star, the light we see is un-polarized. This means that the direction of light wave fluctuations is random. If however a planet has an atmosphere, polarization occurs when light waves interact with atmospheric molecules. Measurements can be taken by analysing the combined light polarization produced by the star and planet. Composition of individual planet's atmospheres can also be ascertained. The drawback to this method is; no atmosphere, no polarimetry. Planet HD 189733 b was detected by this method in 2008, but no other discovery since,

Astrometry

This method consists of exactly measuring where the star sits in the sky. This is measured over a period of time and the changes recorded. During the 20th century this was performed using photographic plates, increasing accuracy. The star will move in a miniscule circular/elliptical orbit due to the gravitational influence of the planet. This theory dates back as far as William Herschel 1738-1822. This technique is not widely subscribed to as changes in star positions are, in the main, immeasurably small.

Confirmed Exoplanet Statistics

Discovery Method	Number of Planets
Astrometry	1
Imaging	45
Radial Velocity	751
Transit	3059
Transit timing variations	16
Eclipse timing variations	9
Microlensing	75
Pulsar timing variations	6
Pulsation timing variations	2
Orbital brightness modulations	6
Exoplanet Total	3970

Data credits: https://exoplanetarchive.ipac.caltech.edu/docs/counts_detail.html

References:

1. https://en.wikipedia.org/wiki/Methods_of_detecting_exoplanets
2. <https://exoplanets.nasa.gov/5-ways-to-find-a-planet>
3. https://www.nasa.gov/mission_pages/kepler/multimedia/images/kepler-transit-graph.html
4. www.planetary.org/explore/space-topics/exoplanets/how-to-search-for-exoplanets.html

The Crowd and the Cosmos



The world of science has been transformed. Where once astronomers sat at the controls of giant telescopes in remote locations, praying for clear skies, now they have no need to budge from their desks as data arrives in their inbox. And what they receive is overwhelming. Projects are now able to provide more data in a few nights than in the whole of humanity's history of observing the Universe. But more data means more scientists needed to analyse it. Many more. And so, across a variety of scientific fields, it's time for us all to pitch in and we'd love your members to get involved...

How? By joining [Zooniverse](https://www.zooniverse.org/), the world's largest and most popular citizen science project, co-founded by *BBC Sky at Night* presenter and Professor of astrophysics at Oxford, [Chris Lintott](https://www.chrislintott.com/).

In his semi-autobiographical new book, [*The Crowd and the Cosmos*](#), publishing late October, Chris tells his own story and tells the story of how and why Zooniverse came about, how

and why it works, and some of the really amazing discoveries members of the public have made.

Brian Cox says: *"The Crowd and the Cosmos is a superbly written insight into the unique and powerful contribution enthusiasts from all walks of life can make to scientific knowledge. It is also a fascinating and much-needed description of how we acquire reliable knowledge about nature, from the search for planets and perhaps civilizations around distant stars to observations of penguins in the Antarctic and what they can teach us about the impact we are having on our own world."*

Martin Rees : *"The Crowd and the Cosmos gives an authentic flavour of astronomical research and its appeal. But it's especially significant because it offers a first-hand account of how Chris Lintott conceived and led the "Zooniverse" project, triggering a benign social revolution on scholarship and education extending far wider than astronomy".*

STOP PRESS: I've just received a copy of Chris Lintott's new book (published by Oxford University Press, ISBN 978-0-19-884222-4) which I hope to review in the next OASI News.

The book will be available in the UK in October.

Normally retailing at £20, it will be on offer to order online for £14 from <http://www.oup.com> with promotion code ASPROMPS.

Martin R-H

Gyulbudaghian's Nebula

Mike Harlow



Cataclysmic Variable Stars

Mike Harlow

There are many types of variable stars but cataclysmic variables, or CVs for short, have some of the biggest changes in brightness over the shortest time scales. Although their behaviour is quite well understood, they aren't completely predictable so the timing of their sudden brightening, or outburst, isn't known in advance which adds to the interest in observing them.

Two CVs have been observed in some detail and a list of other interesting targets is given at the end.

What are CVs?

CVs are small, double star systems, comprising a red dwarf and a white dwarf in a tight orbit. Typically, the whole system would fit inside our Sun and the two stars orbit each other in periods of just a few hours. The stars are so close together that gas is pulled off the red dwarf by the intense gravity of the white dwarf forming an accretion disc. This disc gradually gets denser and denser until it becomes unstable, heats up suddenly and causes the outburst. It then cools over days or weeks and the accretion process starts over again. An excellent book on the subject giving a good introduction to CVs is given in reference [1].

SS Cygni (RA 21h 42m 43s Dec +43d 35m 08s (J2000))

Discovered in 1896 this is possibly the most famous and well observed CV. Its recent outburst, at the end of August 2019, was well observed over three weeks thanks to a spell of very good

weather. SS Cyg is easy to find by star hopping from Deneb due west to the closest bright star to it, 75 Cyg. Figure 1 shows the area containing SS Cyg which is in a rich starfield, having a nice chain of stars leading to three distant 15th magnitude galaxies. In colour images these galaxies are very red due to absorption by dust in the milky way.



Figure 1. The field containing SS Cygni. Field of view 24 x 14 arc min.

Outbursts of SS Cyg occur on average every month or so. Figure 2 shows a lightcurve generated from data taken from the American Association of Variable Star Observers, AAVSO, web site for the last year [2]. It shows three distinct types of outburst. Type one has a rapid rise, relatively long plateau at maximum and slow fade, type two has a slower rise, shorter time at maximum and a slow fade. Type three are shorter, smaller amplitude outbursts often occurring in groups. Such a group preceded the outburst discussed below.

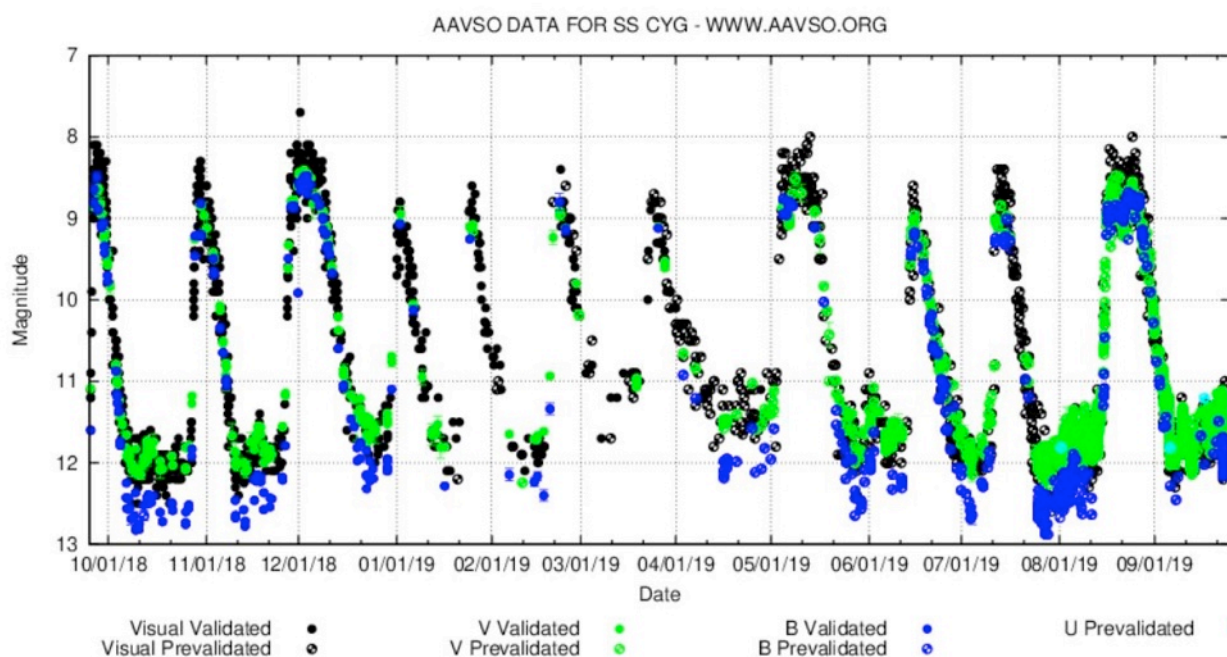


Figure 2. A year in the life of SS Cyg. AAVSO data

Images of SS Cyg were first taken on 13th August 2019 when it was still at minimum light in its quiescent state. This is where it sits most of the time at near magnitude 12. A few days later there were signs that it was starting to brighten, having increased about one magnitude by 15th August. Unfortunately, the main phase of the outburst occurred during daytime on 16th August and that night it was raining in Suffolk! By the time it was imaged again, on 19th August, it was at maximum light. The good weather then returned and it was imaged at every opportunity revealing a very long plateau phase of about 10 days before the fade began on 28th August. Another week passed as it faded back to magnitude 12. Figure 3 summarises these results with some of the images taken.

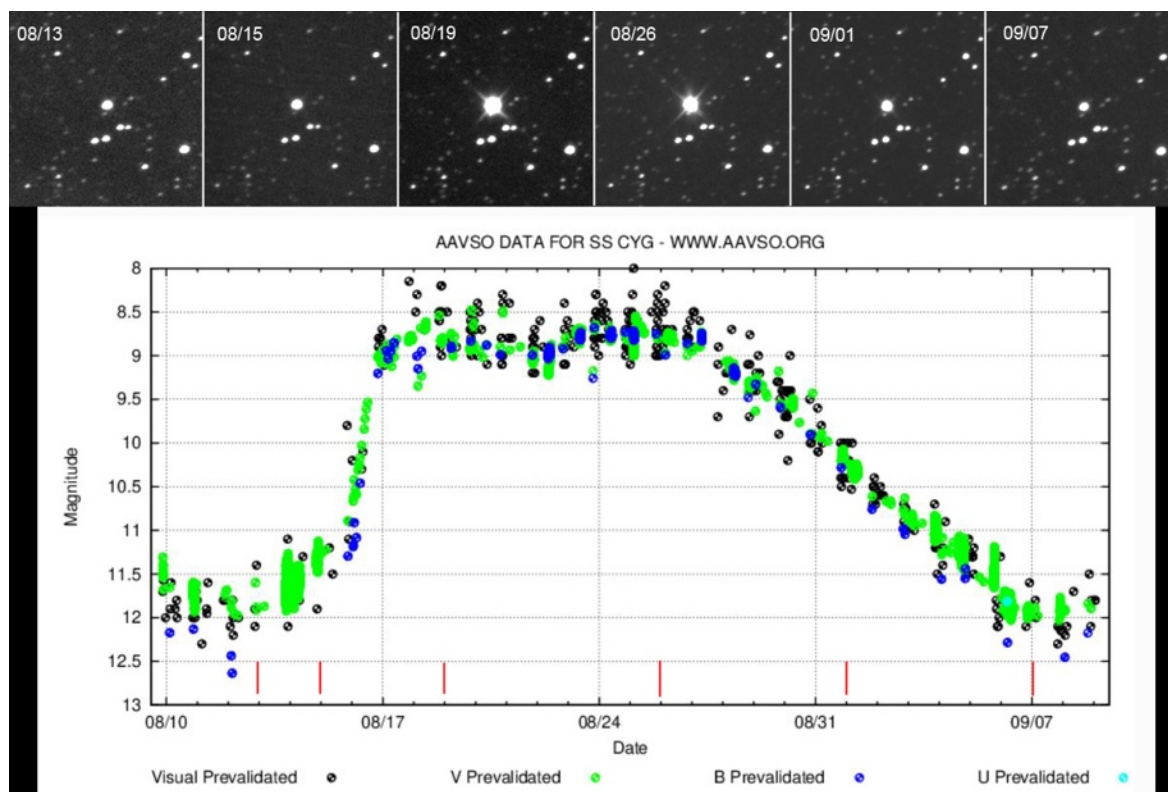
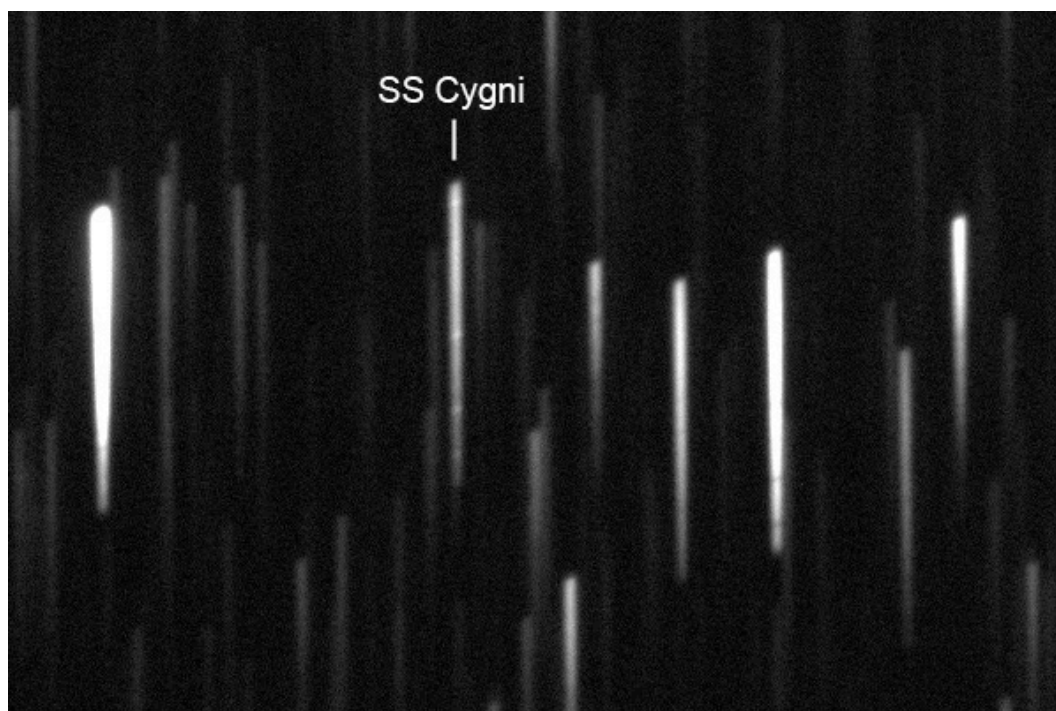


Figure 3. The outburst of SS Cyg August to September 2019.
AAVSO lightcurve and images from home with 12 inch F/3.6 astrograph.
Red bars show dates of images.

During the fade, spectroscopy was attempted. Some spectra are shown in ref[1] and David Boyd of the BAA has also followed the spectrum during an outburst [3]. Figure 4 shows a low resolution spectrum when SS Cyg was near magnitude 11 revealing hydrogen Balmer series emission lines. The spectrum corresponds to spectrum (e) in Boyd's article.



**Figure 4. Spectrum of SS Cyg approaching minimum, 4th September 2019.
3 degree objective prism on 12 inch F/3.6 astrograph. Field of view 14 x 9 arc minutes.**

Emission lines are produced from tenuous gas in the system, probably material streaming from the red dwarf or a thinner halo of hydrogen around the denser accretion disc excited by ultraviolet light from the white dwarf.

SS Cyg is well placed in the summer and autumn but there is another well known CV for the winter and spring: U Geminorum.

U Geminorum (RA 07h 55m 06s Dec. +22d 00m 09s (J2000))

U Gem, which was discovered way back in 1855, is situated a few degrees south of Castor and Pollux in Gemini so it is relatively easy to find. Its outbursts occur less frequently than SS Cyg averaging about 100 days between events and the change in brightness is slightly greater, rising from magnitude 14 to near magnitude 8.5, although the outburst in March only reached 9.5. The first image acquired of U Gem on 23rd March 2019 showed that it was in the outburst phase, and it was followed for the next few weeks down to near minimum. Figure 5 summarises the observations again with an AAVSO lightcurve.

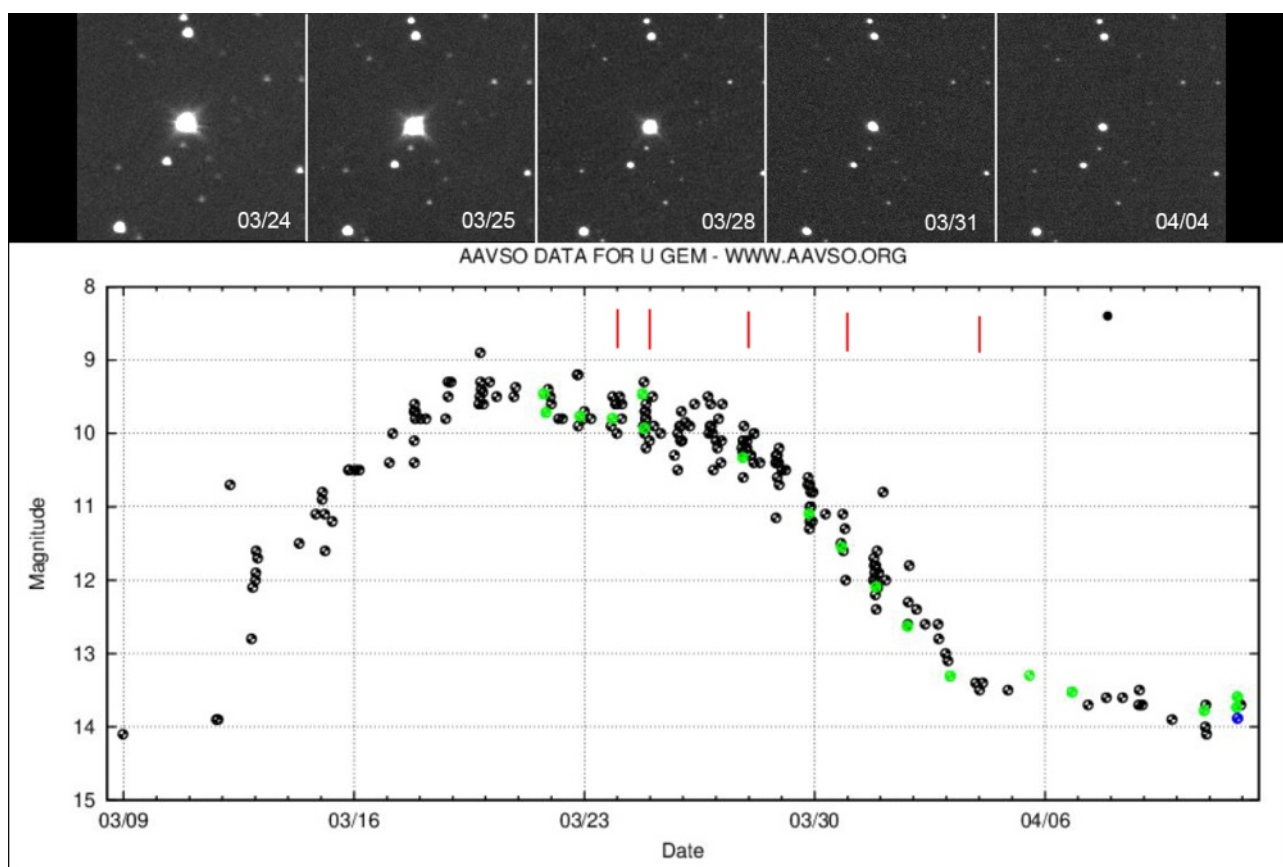


Figure 5. Outburst lightcurve of U Gem in March-April 2019 with images from 12 inch F/3.6 astrograph. Red bars show date of images.

The relatively slow rise to maximum was missed but much of the plateau phase and subsequent fade was observed. Gemini is hidden by glare from the Sun in summer so the likely outburst in July was missed. The next outburst is likely to occur in October or November so regular observing will resume when Gemini becomes visible in the morning sky. Catching the star on its rapid rise to maximum would be fascinating to see.

Others to watch ...

There are many CVs out there and a list of the more interesting ones is given in ref [1]. Some of the targets on my list are summarised below.

Z Camelopardalis (RA 08h 25m 13s Dec +73d 06m 43s (J2000))

A bizarre sub-class of CVs, the Z Cam stars turn off for weeks or months before resuming 'normal' outburst activity. During the off state, they shine at some intermediate magnitude between maximum and minimum. At the time of writing, Z Cam has been stable for almost 350 days, since 12th October 2018, but it could resume outbursts at any time! Figure 6 shows its lightcurve over the last 2 years.

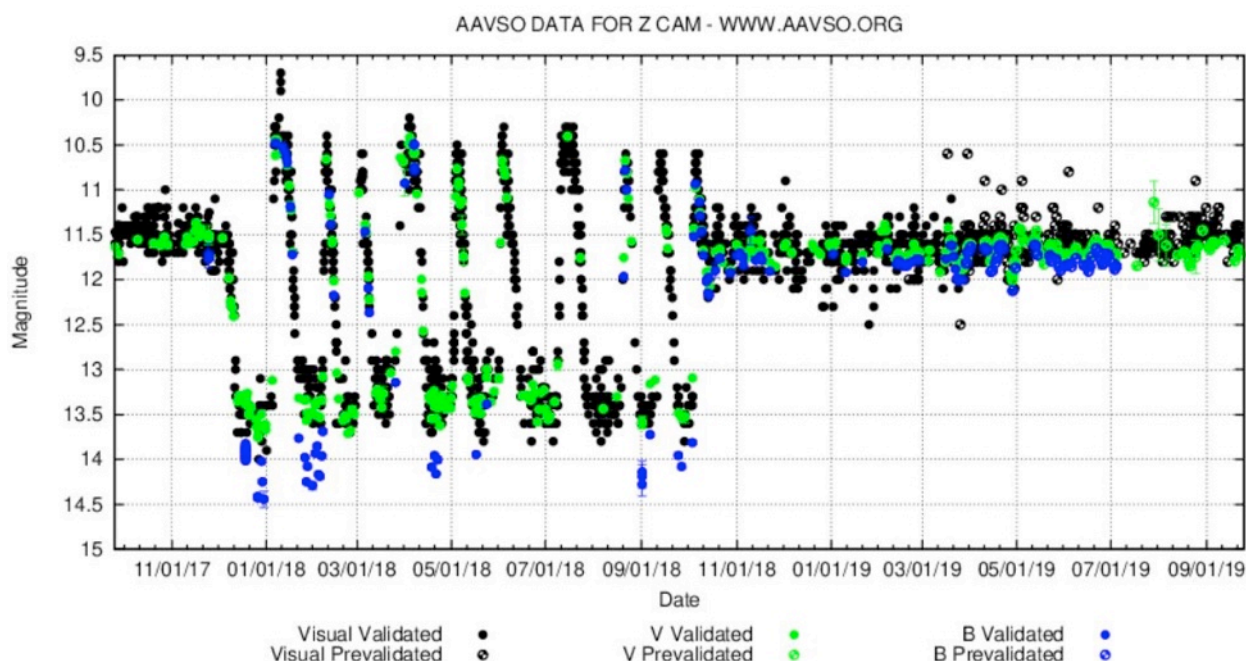
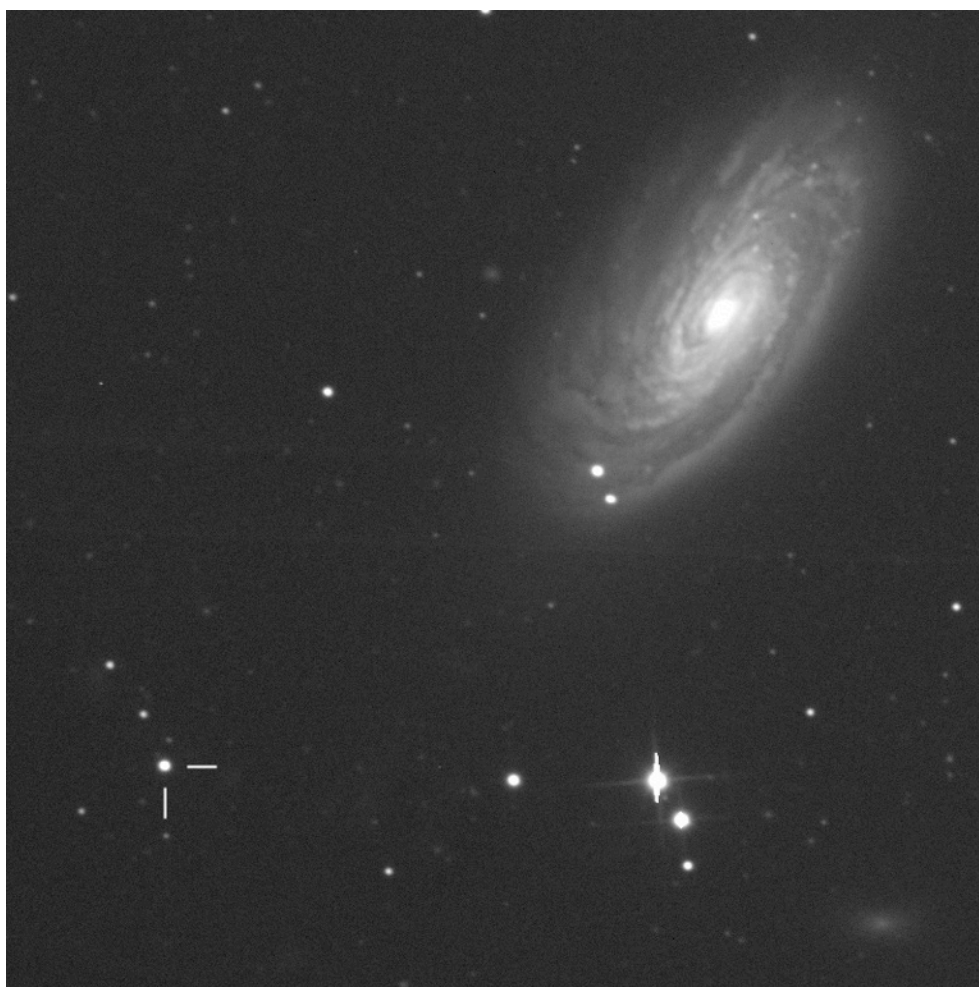


Figure 6. Z Cam lightcurve over the last two years from AAVSO data.

AL Comae Berenices (RA 12h 32m 25s Dec +14d 20m 44s (J2000))

AL Com is a really faint object for most of the time at near magnitude 19 or 20, so a challenge even for CCD imaging. But at intervals of over a year, it can suddenly increase to magnitude 13 which corresponds to an increase in brightness of almost 250 times. What makes it more interesting is that it is in the same field as M88 and it makes a really nice target for imaging as shown in figure 7.

Figure 7. Outburst of AL Com remotely imaged on 24th April 2019 using the University of Iowa 0.5m Gemini telescope.



RX Andromedae (RA 01h 04m 36s Dec +41d 18m 00s (J2000))

RX And is another Z Cam star. It is currently actively going up and down in brightness on a weekly basis but it could turn off at any time. Notable because it is only four degrees away from M31.

VW Hydri (RA 04h 09m 08s Dec -71d 17m 40s (J2000))

And finally, for anyone looking for a remote telescope project, why not try VW Hyi, a far southern CV. In fact, so far south it lies between the two Magellanic clouds. It has been extensively studied by the Royal Astronomical Society of New Zealand variable star section in the past and it typically shows very short outbursts, lasting just a few days, separated by a few weeks.

Conclusion

CVs can show a dramatic increase in brightness over just a day or two. Unfortunately, they are intrinsically faint systems and none are close enough to us to be visible without using a telescope. But what if one was much closer? Imagine one of the seven bright stars of Ursa Major as a CV. Usually at magnitude 2 it could rise in as little as 24 hours to be as bright as Venus, stay there for a week or more and then fade back to magnitude 2. If we had a CV that close it would certainly get a lot of attention.

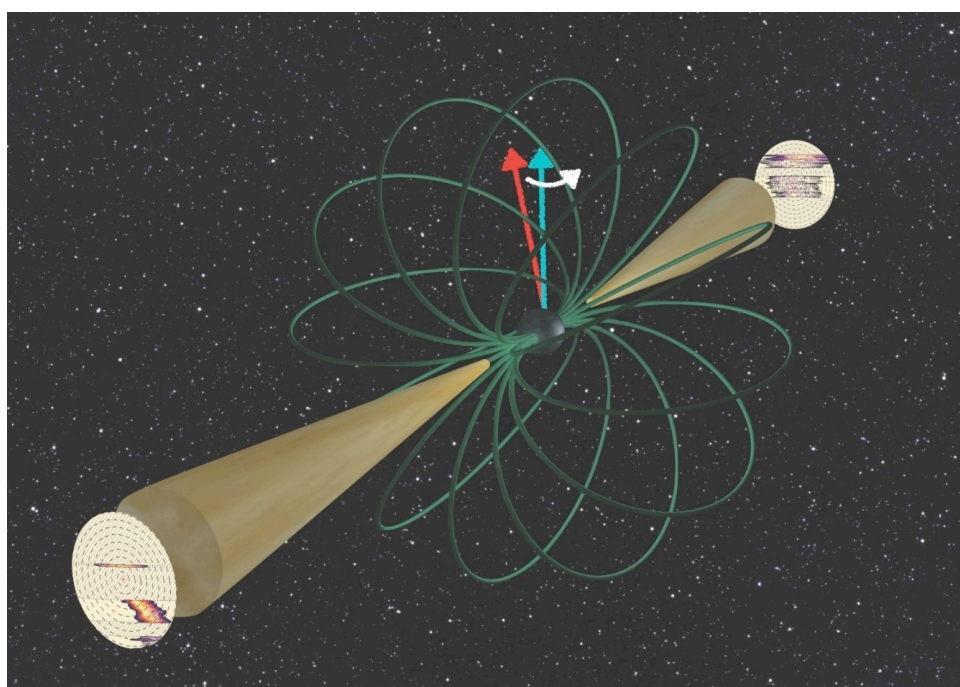
References

1. Cataclysmic variable stars: How and why they vary. Coel Hellier, Springer-Praxis Books in Astronomy and Space Sciences, 2001.
2. American Association of Variable Star Observers (AAVSO) light curve generator: <https://www.aavso.org/lcg>
3. Spectroscopic observations of SS Cygni, D. Boyd, BAAJ 2013: https://www.britastro.org/journal_item/3235

Using gravity to map the radio emission beams of neutron stars

Source: <https://www.manchester.ac.uk/discover/news/using-gravity-to-map-the-radio-emission-beams-of-neutron-stars/>

6 September 2019



Researchers have been successful in mapping the topography of both magnetic poles of a pulsar for the first time. This was possible thanks to an effect of gravity described by Einstein's theory of general relativity.

Pulsars are rapidly rotating neutron stars and are one of the most exotic objects in the Universe with a gravitational field second only to black holes. They have the strongest magnetic fields in the Universe and emit radio emission from their magnetic poles. The results were published in the journal [Science](#) on the 6 September 2019.

See source for video of Geodetic Precession in Pulsar J1906+0746.

"This pulsar, known as PSR J1906+0746, is a member of a binary system with another neutron star. The extreme gravitational environment of the two neutron stars causes spacetime to be distorted. This in turn causes the pulsar to precess, changing the angle we view the radio emission and thus allowing us to map out the emission." said Professor Andrew Lyne of [The University of Manchester](#), who used the Lovell telescope at [Jodrell Bank Observatory](#) to first determine the nature of this system.

Ben Stappers, Professor of [Astrophysics](#) at The University of Manchester said: "This pulsar is expected to precess so far that in 2028 the pulsar will no longer be visible from Earth and we will continue to monitor it with our telescopes including the Lovell Telescope at Jodrell Bank Observatory up to that point to see what more we can learn from this interesting system."

"This pulsar is expected to precess so far that in 2028 the pulsar will no longer be visible from Earth and we will continue to monitor it with our telescopes including the Lovell Telescope at Jodrell Bank Observatory up to that point to see what more we can learn from this interesting system."

Benjamin Stappers, Professor of Astrophysics at The University of Manchester and co-author of the work

The research team, led by Gregory Desvignes from the [Max Planck Institute for Radio Astronomy](#) (MPIfR) in Bonn, used observations with the Arecibo and Nançay telescopes

"PSR J1906+0746 is a unique laboratory in which we can simultaneously constrain the radio pulsar emission physics and test Einstein's theory of general relativity", says Gregory Desvignes. "These results show that the emission beam is not round as might be expected, but elongated."

This result is the most precise measurement of the so-called geodetic precession effect predicted by the theory of general relativity. The maps of these emission beams also provide important information on the double neutron star population in our galaxy and the expected gravitational wave detection rate for neutron star mergers.

"The experiment took us a long time to complete, but was well worth the investment in telescope time", concludes Michael Kramer, Director of MPIfR and University of Manchester affiliated Professor.

Christmas Party 2019

Coach and Horses in Melton

Date: Wednesday 11th December

Time: 20:00

Deposit: £5

2 course £19.00

3 Course £23.00

If you would like to attend please contact me (Roy Gooding) with your menu choice and deposit.

Email: r.gooding908@btinternet.com



Starters

Leek & Roasted Potato Soup

G/F, D/F

Served with fresh bread

Smoked Fish Platter

G/F, D/F

Pinney's of Orford mackerel & oak roasted salmon with lemon mayonnaise & baby leaf

Slow Roasted Sticky Pork Belly

G/F, D/F

Crunchy Asian slaw salad

3-Cheese Baked Portobello Mushroom

G/F

Herb crumb & baby leaf

Filo Wrapped Tiger Prawns

Tiger prawns wrapped in filo pastry with a sweet chilli dip

Main Course

Traditional Roast Suffolk Turkey

G/F, D/F

Roasted Suffolk turkey breast served with rich sage & onion stuffing, Procter's Cumberland chipolata wrapped in smoked bacon, golden roasted potatoes, fresh vegetables & rich gravy

Leek & Winter Vegetable Wellington

D/F

Served with white wine chive cream sauce & vegetable medley

Slow Roasted Shoulder of Lamb

G/F, D/F

Served with fondant potatoes, minted redcurrant gravy & vegetable medley

Smoked Haddock & Prawn Gratin

cooked in herb cream sauce with herb & mozzarella crumb & served with a vegetable medley

Roasted Sirloin Steak

(£5 supplement)

G/F, D/F

Served with garlic buttered mushrooms, coleslaw, onion rings & chips

Desserts

Traditional Christmas pudding

Served with brandy sauce

Chocolate Truffle Tart G/F

Served with salted caramel ice cream

Selection of Fine Cheese & Biscuits

G/F

with a selection of crackers & apple

Mulled Berry Trifle

Chocolate shavings

Mince Pies to Finish G/F

G/F Gluten-free

D/F Dairy-free