Federation of Astronomical Societies

Newsletter

No 139: August 2024

fedastro.org.uk

Note: The FAS Council Reserves the Right to publish articles, events and reports submitted to the FAS Newsletter

Noctilucent Clouds

Image by David Orr
Caithness Astronomy Group
Taken on the morning of 26 June 2024 from my house in Thurso, Caithness
Smartphone Camera

FAS Council

Interim President
Dr Paul A Daniels
Hon. Member of Guildford AS
Rose Hill
High Green, Bradenham
Thetford, Norfolk
IP25 7RD

president@fedastro.org.uk
07802 324697

Treasurer
Pat McEvoy
77 Binsteed Road
Portsmouth
PO2 7PJ

treasurer@fedastro.org.uk
07729 696832

Secretary
Shaun O'Dell

secretary@fedastro.org.uk

Editor
Michael Bryce
Carolian AS & Bromsgrove AS
49 Cortland Way
Stourport-on-Severn
Worcestershire
DY13 8NZ

newsletter@fedastro.org.uk
07821 896304

Interim President's Spot:
Dr Paul A Daniels

20 July 2024

Apologies in advance if this issue's IPS is a bit shorter than usual but I've been busy writing the article you'll find later in this newsletter. I started out early with good intentions of keeping it concise but it grew faster than the Summer grass in my garden and I ran out of time for pre-pending an IPS 'volume' to the front of the newsletter [SFX: distant cheering]!

At the October 2023 AGM we had the problem of a serious shortage of candidates for Council: we needed someone who could take over from the excellent job that Martin Baker (Guildford AS) had done as our webmaster and someone who'd be able to take over from the great work by Richard Stebbing (also Guildford AS) as our Secretary. We also had vacancies for a person or persons to take over the roles of Membership Secretary and Insurance Officer.

Unfortunately we had no-one come forward for any of those roles so we owe a great debt of thanks to FAS Vice-President Clare Lauwerys who took on the major burden of sorting out the PLI after our previous insurer decided that they didn't wish to offer that policy any longer, polished up her already good IT skills as our webmaster and also took on the membership renewal work – and all that on top of her work as Secretary of North Essex AS! We also have to thank Shaun O'Dell, the FAS' longest-serving Council member (and normally 'without portfolio' due to his work commitments), who stepped in to fill the position of FAS Secretary.

As you may recall, I'd intended to stand down as FAS President at the last AGM but, as no-one came forward to take my place, I felt it better to offer to continue (with the formal approval of the FAS Council) than to leave the FAS without a lead. The plan was that I'd help Clare with getting the PLI back in place and that I'd seek someone who'd be able to take over from me in this 'interim' capacity. It's rumoured that we're now into the second half of Summer so I'll stay in place until this year's AGM (date to be decided, probably in October) but really must, after seven years, step back and let someone else share the fun.

It's been a difficult year, our 50th anniversary year, and we'd hoped to be able to offer at least one, if not two, conventions as well as a webinar or two. However, the shortage of Council members and difficulties arranging a venue mean that we may have none of those unless we can squeeze in a webinar and convention towards the end of the year. We've also had several serious health issues on Council that's limited what we'd hoped to achieve.

This small, overloaded Council is clearly not a sustainable situation and I urge all of you who have previous committee or organising experience to consider standing for a position on the FAS Council when we send out the AGM details. If anyone has questions about what's entailed then please feel free to contact me on president@fedastro.org.uk.

It recently occurred to me that, whilst we're always open to feedback from members via the usual email, phone, etc, channels, there wasn't a ready FAS forum where members could make suggestions to or ask for help from other member societies. There was nowhere where astronomy questions could be asked and, hopefully, knowledgeable responses given. I suggested to the Council members that we add a 'Letters Page' to the newsletter (and especially now that we publish six time per year). With the standard caveats that we be able to select and edit letters due to their content this was agreed and so we now have a nascent letters page. I encourage you all to send in letters/emails to our FAS Newsletter Editor, Michael Bryce, at newsletter@fedastro.org.uk with any questions or suggestions for the FAS or its members that you feel might be of benefit to others.

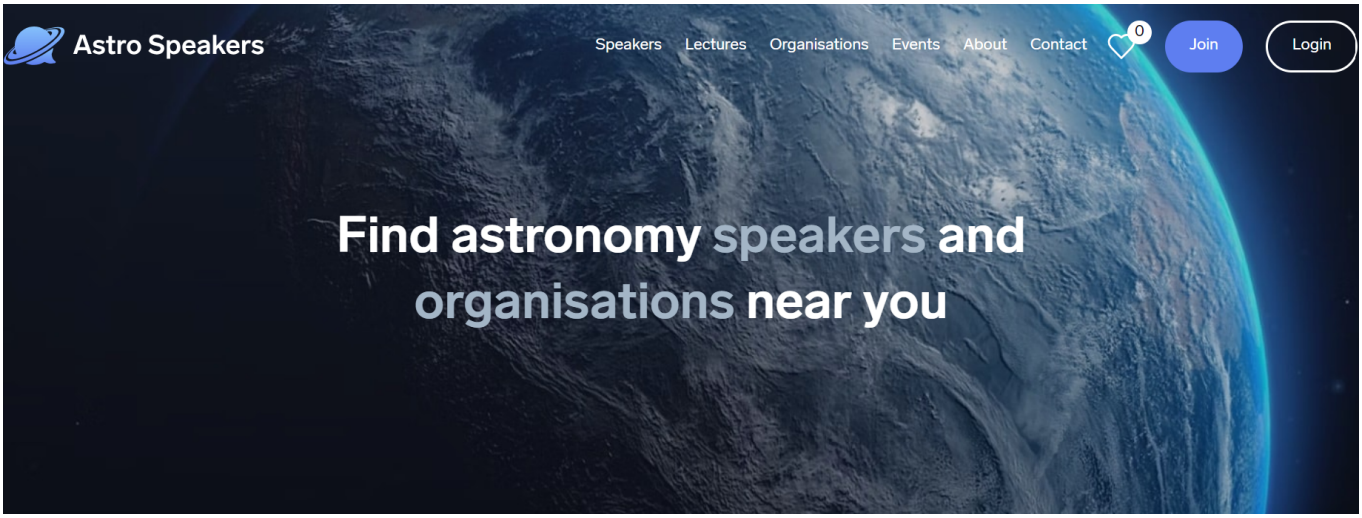
We're also looking at setting up a Discord server for the FAS so that members will have a forum for more spontaneous discussion.

That's all for now, stay safe and clear skies!

Paul

Astro Speakers have a new website – new opportunities

Graham Winstanley



The new website has been made possible by partnering with Go Stargazing. The Go Stargazing website is already a well-established source of information on astronomy events and lectures around the UK that is regularly used by astronomers and those with a general interest in the subject. Neill Sanders, the owner of gostargazing.co.uk, has generously funded the design of the new website and personally completed the development work to get it working. Astro Speakers and Go Stargazing are two not-for-profit ventures run solely for the benefit of the UK Astronomy community.

Astro Speakers was launched by Graham Winstanley and Glyn de Lacy in 2015, initially with the support of about a dozen speakers. Glyn prepared an attractive and functional site and it has proved popular for societies to fill their lecture programmes and with speakers seeking engagements. Glyn acknowledges that his web skills are outdated, and we have been seeking volunteers to help for some time. Thanks are due to Glyn for the huge number of hours spent on building and maintaining the old website.

Go Stargazing have been active in promoting opportunities for anyone to attend stargazing experiences around the country at dark sky sites or local society observatories. Through this activity they have been approached by organisations such as hotels, camping sites, etc to supply contacts able to deliver a stargazing experience. Around the country there are many amateur astronomers already doing this through local societies. Astro Speakers would like them to join on our website as it is an opportunity for you or your club to be paid for your outreach.

Astro Speakers is here to help anyone engaged in astronomy outreach to contact their target audience. Also let Go Stargazing know when you are speaking or running an event.

Many well-known amateur and professional astronomers are already members of Astro Speakers and just a few of the positive comments received are:

> "I am happy to make a donation. You do a terrific job and I have had some great opportunities (including national TV) on the back of your site."
>
> "This is an excellent idea, long overdue and just what is needed for astronomy outreach. There has been a real gap in trying to connect those interested in giving talks/presentations etc with those who are looking for volunteers. I would encourage all those who regularly give talks to the public, societies and schools to sign-up to this excellent website." By a past President of the RAS.

Graham Winstanley is Secretary of Lincoln Astronomical Society and the current Treasurer of the British Astronomical Association.

Graham Winstanley
Secretary, Astro Speakers
astrospeakers.org

Letters to the Editor

The World's First Public Access Commercial Space Telescope

Dear FAS Members,

My name is David Harrison and I am CEO of the Space Exploration Group UK Ltd by profession and an amateur astronomer by passion. It is my company's plan to launch the World's First **Public Access Space Telescope**, using a small satellite that exploits the improving low cost technologies being developed across the space sector.

As part of this business initiative I am seeking to better understand the interest in accessing such a telescope by amateur astronomers represented by those in your society. This will then help shape the wider funding case that already underpins this initiative.

The scope itself will include a wide-field broadband camera with a focal length of 70mm and a narrow-field SCT with a focal length of at least 850mm - although these details may be modified if needs are clear from the community.

The scope itself could serve many functions, linked to individual access, the monitoring of live astronomical events (e.g. Jupiter eclipses and comets) and wider public outreach. The cost to access such a telescope (in the manner of other terrestrial robotic telescopes) is yet to be finalised but would be of the order of £250 for a 60 minute imaging session.

I would be happy to describe further details - indeed I am a member of Chester Astronomical Society and I gave a presentation on the Project on Wednesday, 31 July 2024 at Burley Hall, Waverton.

I appreciate your time on this matter and look forward to any thoughts you might be able to offer.

Best Regards

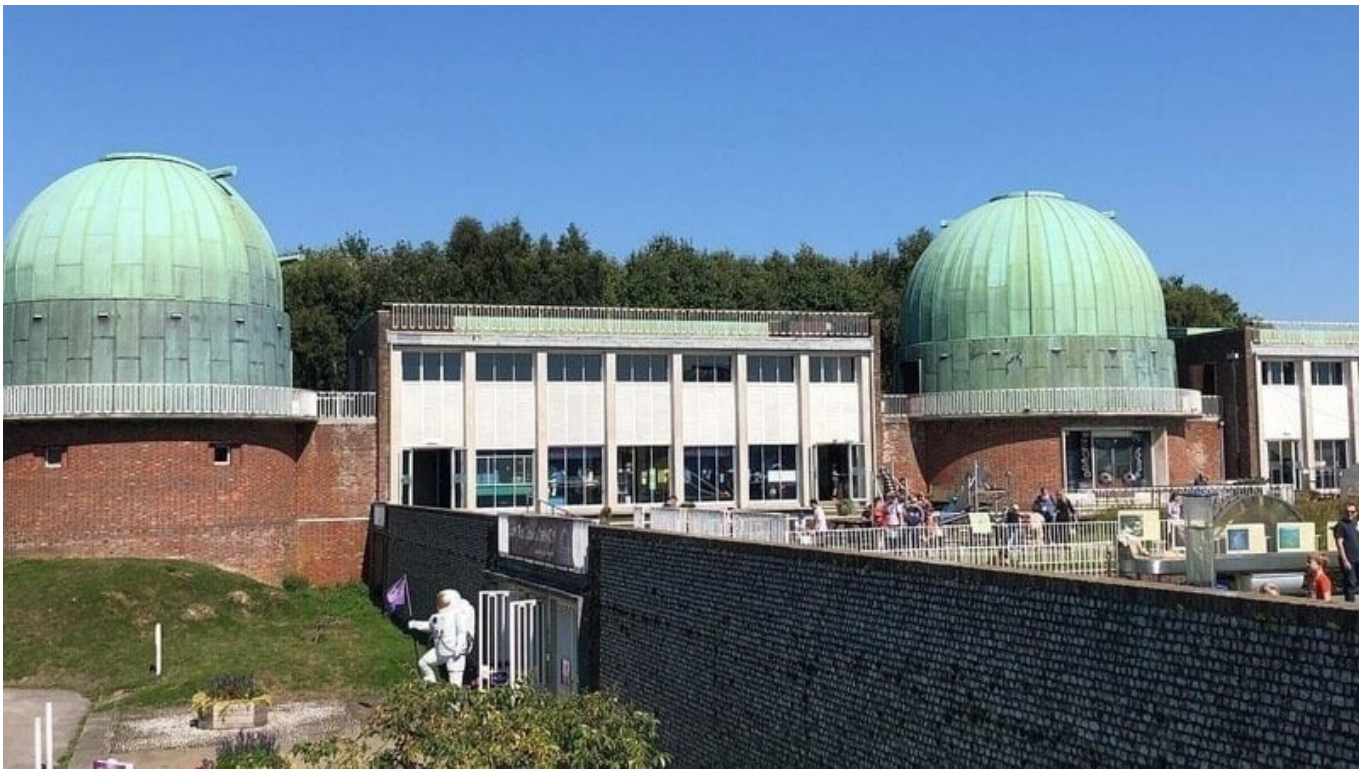
David Harrison
Director, Space Exploration Group UK Ltd
Tel: 07706 130074
Email: harrisondavid123@aol.com

From the web site:

Space Exploration Group Uk Ltd are collaborating with a premium telescope manufacturer together with experts in Astrophysics to deliver the world's first public access commercial space telescope. We are determined to democratise access to space for everyone. By working together with like minded individuals we will achieve our aims. We are planning to launch a CubeSat satellite with a smart telescope using the latest AI technologies to bring a profound astronomical experience to everyone. The telescope will automatically find the target you select in the astro menu, it will track the object as long as you want to view it. You can move onto other objects in the night sky. Just think no more waiting for the skies to clear, no atmospheric pollution. The space telescope will be available to use 24 hours a day, 7 days a week, 365 days of the year. Future upgrades will launch telescopes with the newest and best advances in technology. The sky isn't the limit! Discounted pre-launch bookings will be available as soon as the launch date is confirmed. Here's to a very exciting future available to anyone. Imagine a special birthday event with a live link to space, or astronomical societies observing space together, it will be magnificent!

spaceexplorationgroupukltd.co.uk

Former Royal Observatory Future Uncertain



The Observatory Science Centre is an educational charity which has called the Grade II listed, former home of the Royal Greenwich Observatory at Herstmonceux, East Sussex, home for the last 30 years. The Canadian landlords, Queen's University, who also own Herstmonceux Castle, are not renewing the Science Centre's lease, so come the end of the 2026 season the Science Centre will be homeless.

Over the years the science centre have worked tirelessly to fund and restore the site and the telescopes back to their former glory.

The centre is a major venue for exhibitions, lectures and educational programmes. The renovated telescopes provide a unique setting for the general public, schools, colleges, and brownie and scout groups to learn about science, space and the world around them.

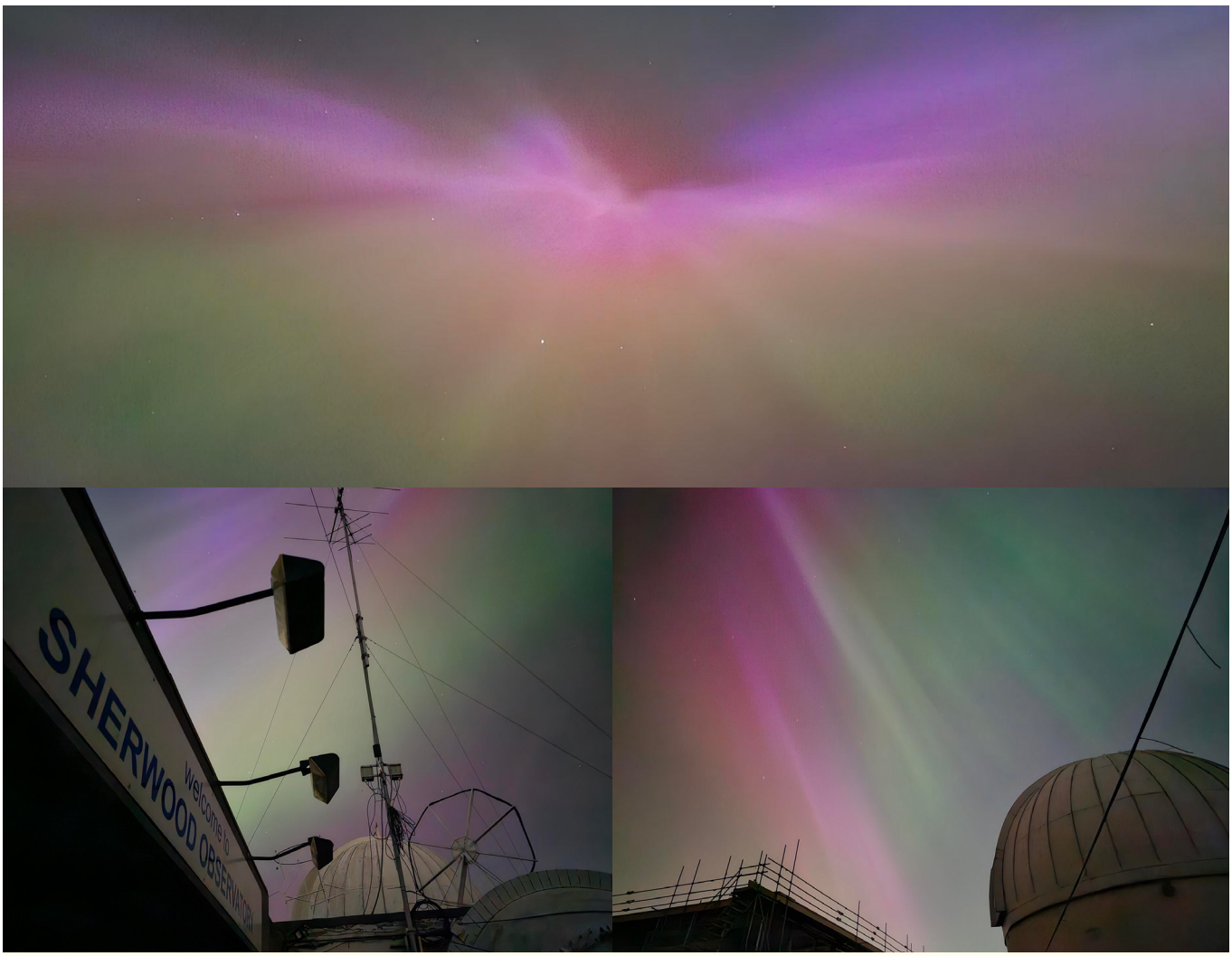
Whilst the Science Centre is in search for a new site to continue operations beyond 2026, they should not have to leave the Observatory site at all and the historic site should be preserved for future generations as a great educational tool of significant historical importance.

Please sign this petition for someone to step in and prevent the the Science Centre from having to leave the Observatory site.

https://www.change.org/p/save-the-observatory-science-centre-herstmonceux

The Auroral Display of 10 May 2024

Images Above and below: Stephen Webber
Cardiff Astronomical Society
Exposure details on image



Images Above: Tony Booth
Sherwood Observatory Member
All taken with a Samsung Galaxy S23 Ultra
ISO3200
1/2sec exposure

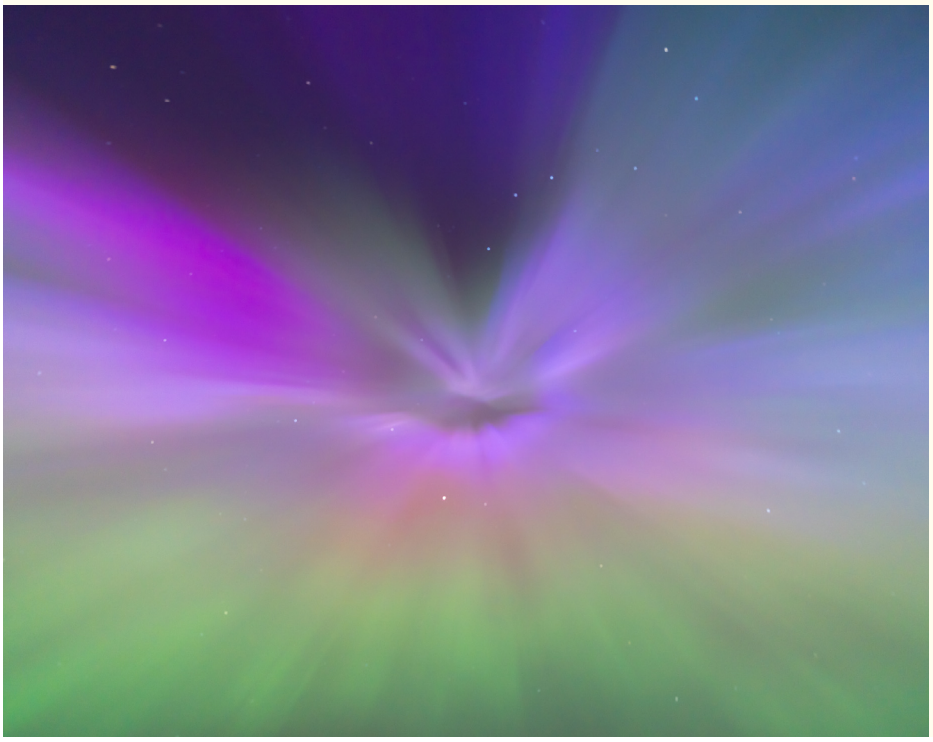


Image Left: Martin Sanderson
Isle of Man Astronomical Society
Camera Sony A7R5
Focal Length 14mm
Aperture F1.8
Exposure length 5 Seconds
ISO 1600

Image Page 6: Martin Sanderson
Isle of Man Astronomical Society
Camera Sony A7R5
Focal Length 14mm
Aperture F2.0
Exposure length 1 Second
ISO 1250

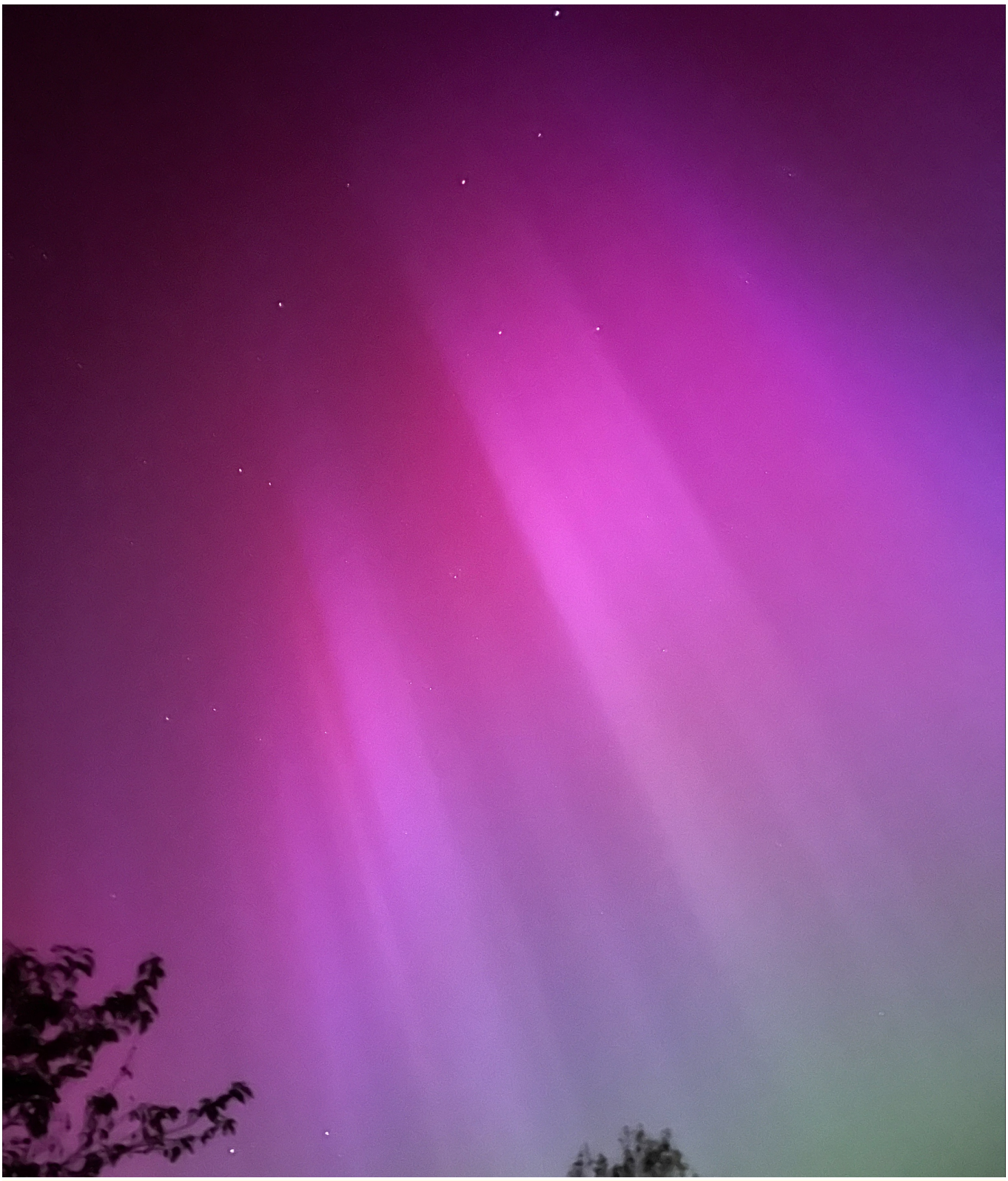


***Image Above**: Karma Toms, a yr 11 student and student of astronomy (GCSE) and part of Roseland Observatory Society*

Apple iPhone 13 mini
Wide Camera - 26 mm f1.6
ISO 3200

Taken at 10.49pm 10 May, Truro, Cornwall

Society for the History of Astronomy

SHA Picnic 21st June 2024 – Rugby School

By Mike Frost

Every year, the Society for the History of Astronomy organises a summer picnic, at a site of historical importance. This year we went to Rugby School, Warwickshire, to see their Temple Observatory.

The day began with talks by two sixth-form students, William and Henry, who had been working in the school archives to research the story of the observatory. It was founded in 1870 by former pupil George Seabroke, with the assistance of schoolteacher Revd J.M. Wilson. Rugby School had been a pioneer in the teaching of science, under the headmastership of Frederick Temple, and wanted an observatory to give their pupils practical science skills.

We had two guests for the day – Peter Seabroke, George Seabroke's great-grandson, and George Seabroke the younger, his great- great- grandson. George the younger is a cosmologist at University College London, working with data from the Gaia satellite, and a few years ago he was delighted to discover the career of his predecessor and namesake. The two Georges' research interests overlapped in the study of double stars. George showed us examples where Seabroke, at the Temple Observatory, had managed to identify double stars which couldn't be seen by Gaia (which is optimised for faint stars). George Jr also mentioned the telescope which had been in his family for five generations, since George Sr acquired it from Matthew Holbeche Bloxam, the local antiquarian who, among other things, wrote down the story of William Webb Ellis, the inventor of rugby football.

Next came the main event – the visit to the Temple Observatory. This is located in the back garden of a private house (originally the observatory curator's house). The main telescope is an 8 ¼ inch Alvan Clark refractor, which originally belonged to Revd William Rutter Dawes, the great visual observer. The telescope needs a little maintenance but is still in working order.

The attendees posed for group photos outside the dome, then made our way back to the main campus of the school for our picnic. The weather was warm and sunny, so we could go with the outdoor option. So, we set up on an embankment overlooking the famous Close of Rugby School. This is the field on which rugby football was invented, 201 years ago, when Webb Ellis "picked up the ball and ran with it", as Matthew Holbeche Bloxam memorably wrote.

After lunch, we were joined by Rugby School archivist. She showed us to the school museum, where we found out more about the origins of the school (founded by Lawrence Sheriff in 1567) and of rugby football and its brutal precursors. The final part of our program was a tour of the old school, with its Harry-Potteresque cloister, and the school chapel, a magnificent high church construction, featuring stained glass windows and memorials to old boys Lewis Carroll and Rupert Brooke, among many others. Next door is the commemorative chapel, a much more austere, contemplative building to honour the many Rugby old boys who died in the world wars.

We had twenty attendees in total. Thanks to Nick Fisher and Jenny Hunt of Rugby School; also, David Lan, Ann Cleverly from the school staff, and the two students, Henry and Will, who lectured to us. Well done guys!

Mike Frost
SHA Meetings Secretary
https://societyforthehistoryofastronomy.com

***Image Left**: Rugby School*

Image Credit: Mike Frost

***Image Left**: SHA Group Photo in front of the Temple Observatory*

Image Credit: Mike Frost

***Image Right**: Temple Observatory Clark Refractor*

Image Credit: Mike Frost

A note from your Editor

I wanted to find a short article about the Clark Refractor. I did a quick search online and I found the FAS Newsletter Number 1 from June 1984! 40 years ago. Wow! Featuring the article "A Night at the Temple Observatory" by Rob Moseley. The original Newsletter is reproduced overleaf. Enjoy!

Michael Bryce

Published by the Federation of Astronomical Societies.
Editor: George Bolland, 25 Deneside, East Dean, Eastbourne BN20 0HY.

issue number 1.

Federation of Astronomical Societies

June 1984

A NIGHT AT THE TEMPLE OBSERVATORY

By Rob Moseley

(Coventry and Warwickshire A.S.)

It is one of those British rarities - a starlit night that's going to stay clear. A couple of phone calls and its all fixed. Tonight I shall be observing with one of the finest refractors ever made.

I throw my observing gear into the back of the car and set off gleefully towards Rugby. It is an October midnight and already frosty. As I head East from Coventry the last quarter Moon hangs over the road ahead, sliding steadily higher in the sky.

During my short drive I ponder on the past of the Temple Observatory and its 8 1/4 inch Clark refractor. During a progressive phase in the late 1860s Rugby School acquired both, due largely to the benefaction of Bishop Temple, onetime headmaster. The object glass is an early masterpiece by Alvan Clark Snr., figured in Massachsetts on the eve of the American Civil War. Put simply - Clark made the finest lenses of his day, in fact, of any day! Perhaps only the great Fraunhofer can be said to vie with him. From its maker the glass crossed the Atlantic and into the possession of the Rev. William (Eagle-Eye) Dawes, one of the greatest observers of the nineteenth century and especially remembered for his work on the theoretical resolving power of telescopes. The "Dawes Limit" is still an everynight expression in astronomy.

In its heyday the Temple refractor was used by the eminent amateurs Seabroke and Wilson to compile a catalogue of over 3000 double stars. Using a Dollond micrometer they were able to divide and measure many difficult binaries. Seabroke gave this understated praise . . "We have every reason to be content with its performance. On very fine nights, which are unhappily of very rare occurence, it divides down to half a second or thereabouts. . . ."
But it isnt double stars that I will be observing tonight. I glance up at the Moon. Is it getting hazey? No, just a smear on the windscreen . . . Times have certainly changed in Rugby since Seabroke's day. I see the sickly yellow glow of a sodium vapour Disneyland reaching up to envelope the Moon - but the effect disappears within the town. I pull up at the gates of the observatory. Its green conical dome looms in the moon-light behind the gatehouse.

Mr. McMenemey, who looks after the starsplitter, is expecting me. He unlocks the door and flings it wide open allowing the chill air to pour into the building and start the necessary process of temperature equalization. We walk into the stone floored library and equipment store, past the disused transit room, and up three steps into the telescope chamber. The high shutters are opened with long poles to reveal a slit of eastern sky. We both stand and look for a moment. Above the Moon the Twins, Castor and Pollux sparkle. After handing me a set of modern orthoscopic eyepieces my companion leaves telling me he will look in again after two hours.

I uncap the telescope and peer at Mr Clark's handiwork. The lens shines softly in the reflected moonlight. But I lose no more time. After fitting a low power ocular I swing the towering tube onto the Moon.

I focus in carefully . . . and there it is. I have never seen the Moon like this before. Even at x175 Plato reaches out to shake hands. There is so much to see. Mount Piton stands on the terminator, dazzling white, but resolvable into three main masses - a serpentine ridge stretching to the craterlet Piton A. The central peak of Tycho can be plainly seen as triple - the third peak classed by Wilkins and Moore as "difficult".

And these views are obtained with terrible seeing! As I had feared by the look of the sky, the air is very unsteady. I settle down to wait. As a more critical test I can't resist turning the telescope on the famous binary star, Castor. Its separation at the moment is around 2.5 arc seconds and slowly widening - so it is an easy job for an 8" Clark! Yet the split is not "clean". The two images shimmer and blur into splodges of light, and I am denied the sight of perfect diffraction rings.

Well - you can't have everything! I turn back to the Moon and commence my programme of work. The particular object of interest to me is lying innocuously to the South of the Mare Nubium - the crater Kies A. It is a small feature, only around 12 miles across - but it is a rare type of banded crater. It has a single E-W band. On the West wall the band actually seems to breach the rampart, and this gap causes interesting shadow effects under a rising sun. Under a setting sun very little is known about the East wall. Orbiter shots are inconclusive. This isn't my first view under local sunset conditions, but it is the first where I have a chance of coming up with anything new.

The seeing refuses to improve. I have to carry on regardless, my full concentration geared for the odd second or two when the air calms down. After a while I move from Kies A to Aristarchus, to Plato, to Piton, to Tycho - and back to Kies A. An hour goes by in five minutes. My pad begins to fill with notes and sketches. As the drive isn't operating I must give the tube the merest touch to watch the lunar landscape cruise through the field over and over again. Even with the lowest power only about a third of the half moon will fit into the field. When I adjust the Declination axis the telescope tracks N-S, and four lunar heavyweights near the terminator succeed each other in increasing splendour. Plato gives way to Archimedes, Archimedes to Maginus, and Maginus to the tremendous Clavius. All these vast enclosures are in high relief, about to be swallowed by the long lunar night.

But my night is almost over. It is 2.30 - and as the Moon rises further the eye-end of the telescope falls, and I have gradually got into one of those "in-between positions - which are a real pain in the neck! It's a good time to break off. Out comes the flask and sandwiches. As I drop my concentration I suddenly feel how cold it is. Mr. McMenemey returns, happy in his insomnia, and we close up the observatory.

I start up my car for the return journey - praying that the heater will work. It does!

ASTROCALENDAR 1985 hopefully will be available in time for Herstmonceux 84. We aim to keep prices stable, so at 50p it is excellent value. It gives the monthly star/planet charts for 1985 and comes in the form of a booklet.

Letter

Dear Sir,

I fear I cannot allow comments attributed to me in the April 1984 Journal to go unchallenged. In the Society Round-up section under Brighton A.S. (P 4) I am referred to as being "not altogether convinced of the accuracy of the conclusions" of an Astrologer using my horoscope as an example to explain his ideas. This comment is the complete reverse of the truth. I stated unequivocally at the meeting concerned that I was very greatly impressed by the accuracy of the astrologer account of my character, as far as I could tell myself. While there is severe doubt as to the 'scientific respectability' of astrology in statistical terms, as one of the humane disciplines with a far longer historical pedigree than any notion of 'exact' science, it deserves better respect than the howling abuse of blinkered astronomers.

Before condemning metaphysical systems we had better realise that there is little comfort to be had from the implacable mathematics of the universe without some system of belief.

Yours faithfully,
Chris Green

This publication is intended to bring the F.A.S. to the attention of ordinary members of local societies. Future issues depend on your reaction. If you have enjoyed reading the articles or if you have any comments, for or against, please write to the Editor with your views.

100 Hours Under One Sky

Dr Jenny Shipway

Help people take their very first step in Astronomy by sharing a new project from the UK's IAU National Outreach Coordinator team, as part of this year's global 100 Hours of Astronomy event (2-5 October 2024).

100 Hours Under One Sky will link people from across the UK to provide a positive first experience of stargazing. Through a mobile-friendly website at 100hours.online, users are challenged to find four easy targets in the night sky to win badges and to share their achievements on our UK map and via social media. All this without having to register or give their exact location.

The 100 Hours website can be used at home but is also designed for use within outreach events. A dynamic webpage, especially designed for outreach events, displays the map and explains how to participate. Simply display this webpage and your attendees can self-lead the activity through their phones.

There will be posters and press releases you can download and edit to help publicise events, and some cheap/easy hands-on family activities to accompany the activity if you fancy doing a little more. We will be distributing printed flyers for advertising the website, and stickers for you to give out during events.

Event kits will be available in mid-August. Outreach organisers will also have exclusive access to the website activities in early September for a test run and so that you know what to expect.

Can't host an event? You can still support us by spreading the word on social media and through other communication channels.

Further details for event organizers will be shared here or via FAS email, and through other networks including the AstroMailbox email distribution list at astromailbox@jiscmail.ac.uk. To find out more about the 100 Hours project or to register your interest in running an event, contact jenny@jennyshipway.com.

This project has been made possible by funding from the Federation of Astronomical Societies and British Astronomical Association, website development and technical wizardry from Go Stargazing!, and support from the Royal Astronomical Society.

Dr Jenny Shipway

A Cutout and Keep Guide for Social Media Managers

Clare Lauwerys
North Essex Astronomical Society

This is very much tongue in cheek, yet I am sure it will resonate with some of you.

If you're the secretary or run the social media for your society, and especially if you are new to the role, then I hope this article will help you deal with some of the common questions from the public

The answers you most often need are:

a) Venus
b) Iron slag
c) Best after midnight. No, I don't know where the darkest areas are near to you

Hmm, I've just been informed by the newsletter editor that while what I've written is marvelous, he likes the articles to be a little longer…

The Venus Answer

This one really speaks for itself, but there are times when you see a question starting with "There was a really bright thing…." and you don't have to read any more to know that the answer is Venus.

The Iron Slag Answer

For me this one comes in clusters and not always connected to meteorites featuring in the media.

You'll be sent some photos and a story of how they found the lumps in the garden or a near by field. The sender will want you to identify them as meteorites. My answer, which I did have saved on a sticky note on my laptop, is "Alas that looks more like iron slag to me. If you google "meteor wrongs" you'll see that it's very common to think a rock might be a meteor" Sometimes I include a link to something like https://www.lpl.arizona.edu/sites/default/files/outreach/Metflowchart2021_Meteorite_Types_3Nov2021.pdf

The Best After Midnight Answer

As soon as the media starts to mention the Perseids, I can guarantee I shall be asked something on the lines of "could you please suggest a good, less light polluted, location to observe the Perseids near <location>"

Now unless the location is somewhere I am familiar with, I don't have a clue. For some strange reason, I don't hold the light levels of the whole of Essex in my head. (I know, I'm really slacking off!)

My reply to this one is along the lines of: "The best time to view is after midnight. If you've got a clear view, you should spot some although be aware that media often goes OTT on the number you'll see. I don't know your part of Essex that well, but this map shows light pollution and may help you, especially if you live somewhere built up and want to travel. https://www.cpre.org.uk/light-pollution-dark-skies-map/

Having said that, you don't need a perfect sky to see them but of course a darker sky will let you see more"

Now obviously, it's great when members of the public show an interest in the hobby we all love so much. We wouldn't do outreach if we weren't keen to share our love and knowledge.

But we are only human and a wry smile is perfectly ok when answering regular questions. I see Venus will be an answer I'll be needing soon!

Clare Lauwerys
FAS Vice President
vicepresident@fedastro.org.uk

North Essex Astronmical Society
northessexastro.co.uk

Stratford-Upon-Avon Astronomical Society

Astronomical Society News

The Stratford upon Avon Astronomical Society meet every 1st and 3rd Tuesdays at 8pm (doors open at 7.30pm) at Alderminster Village Hall. Everyone is welcome, especially beginners and those wanting to learn more. The first Tuesday is a Club Night, in August that will be on 6th August and the speaker on the third Tuesday, which is on 20th August 2024 is due to be Prof Anu Ojha from the University of Leicester and the UK Space Agency, with a talk called 'Space – So what?' based on talk he did to the Royal Institution earlier this year and it is hoped he will be bringing a real space suit to the talk. Please note that the speakers usually start quite promptly at 8pm.

Each month one of our members, Adrian Wakeham, writes an article on aspects of astronomical observation. This month it is the second part of his look at summer stars.

Summer Stars

With shorter, brighter nights upon us, we only have the brighter stars that are reasonable targets for naked eye or binocular observers.

The obvious three stars are fairly much overhead. The summer triangle (a right-angled triangle) of Altair, Vega and Deneb. Running through this, heading towards Cassiopeia, (the W you can see in the sky) is the milky-way (to be precise, an adjoining arm). The haziness you see is countless stars.

Two of my favourite summer stars are Arcturus, (which is a continuation of the plough handle). It's one of the brightest stars in the northern hemisphere, and appears yellow. It is actually a red giant, fairly close at 37 light years. It is 25 times the diameter of the Sun, 170 times brighter, but only slightly heavier.

My other favourite is to be found towards the southern horizon and is plainly pink. This is Antares, (from Greek origin meaning the rival of Mars), and is a red giant at 550 light-years away. It is 700 times the diameter of our Sun (which means it would actually stretch out to Mars's orbit, in our Solar System). It will end its life in a supernova, in the next few thousand years.

So enjoy it whilst it is still about!

Club nights offer more information on what to look out for each month and if it is clear we do some observing just outside the Village Hall, so please join us. There is no charge initially to come along and find out more, but if you do want to become a member then the fee is JUST £15 A YEAR and it's free if you are in full time education. For more details go to the website http://www.astro.org.uk or contact the Chair John Waller **john.waller@astro.org.uk** or on 07703 192188.

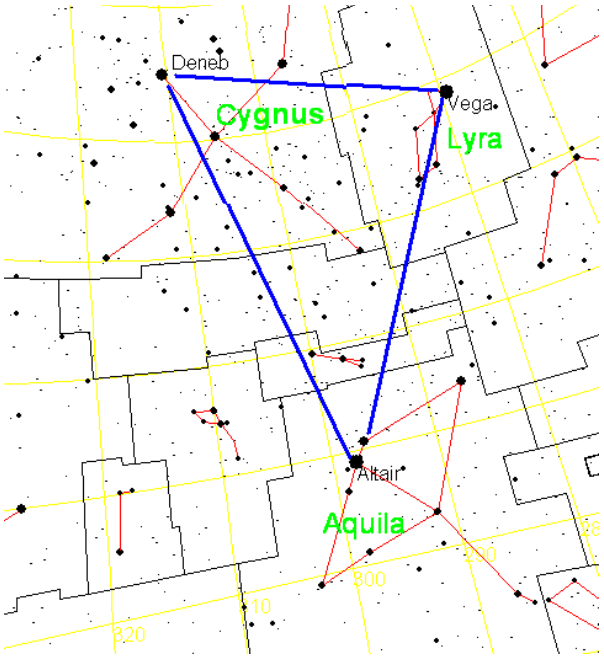
Happy Observing!

Adrian Wakeham
David Benton
http://www.astro.org.uk

The Summer Triangle

The Summer Triangle is an astronomical asterism in the northern celestial hemisphere. The defining vertices of this imaginary triangle are at Altair, Deneb, and Vega, each of which is the brightest star of its constellation (Aquila, Cygnus, and Lyra, respectively). The greatest declination is +45° and lowest is +9° meaning the three can be seen from all places in the Northern Hemisphere and from the home of most people resident in the Southern Hemisphere. The two stars in Aquila and Cygnus represent the head of an eagle and tail of a swan that looks east inscribed into the triangle and forming the altitude of the triangle. Two small constellations, Sagitta and Vulpecula, lie between Aquila in the south of the triangle and Cygnus and Lyra to the north.

Wikipedia
en.wikipedia.org/wiki/Summer_Triangle



The Titius-Bode Law and Orbital Resonance

Dr Paul A Daniels, FRAS

1 Introduction

Most people who take up an interest in astronomy usually learn of the curiosity known as the Titius-Bode Law. It's often just called Bode's Law – except it's not really a 'law'.

So, what *is* the Titius-Bode Law?

Start by forming a sequence of whole numbers beginning with 0, then 1 and, thereafter, doubling:

0, 1, 2, 4, 8, 16, …, *etc*

Multiply the sequence by 0.3:

0.0, 0.3, 0.6, 1.2, 2.4, 4.8, …, *etc*

Finally, add 0.4 to each:

0.4, 0.7, 1.0, 1.6, 2.8, 5.2 …, *etc*.

Amazingly, this purely numerical sequence, unrelated to the physical world (hence why it shouldn't be called a 'law'), correlates approximately to the semi-major axis distances from the Sun of the orbits of some of our solar system's planets and dwarf planets expressed in Astronomical Units (AU, where 1 AU is the average Earth-Sun distance of about 1.5×10^8 km). Table 1 below shows the calculations for the Titius-Bode law and the comparison with the actual distances.

The correlation is strange because not only are the numbers close but there's a value for the average distance to the asteroid belt between Mars and Jupiter (but there's no planet there), Neptune is located where there's no number and Pluto and Orcus lay close to where the Titius-Bode law 'predicts' the next planet should be.

This raises some questions:

a) Is the Titius-Bode law just a coincidence or is there some underlying physical principle that causes it?
b) What implications might the Titius-Bode law have for understanding the formation and/or evolution of the solar system?
c) Are there other examples of Titius-Bode-like laws in the solar system or elsewhere?

2 The History of Titius, Bode and the law

Johann Daniel Tietz was born on 2 January 1729 in what is now Chojnice, Poland, but was then called Konitz in a part of Royal Prussia. He went to school in Gdańsk, studied at the University of Leipzig and, upon becoming an astronomer and a professor at Wittenberg, anglicised his surname to Titius. He died in Wittenburg on 16 December 1796 at the age of 67.

In those days scientists were often attracted to more than one branch of science and Titius was no exception. He studied Physics with a particular interest in Thermometry and wrote on experimental best-practise. In Biology he worked on plant and animal classification. In Astronomy he's probably best known for formulating the Titius-Bode law in 1766 (though it wasn't called that then). It was still a time when the elegance of a numerical sequence implied divine creation and Titius became convinced that there was a missing planet at 2.8 AU from the Sun.

In fact, Titius was not the first to suspect a missing planet: due to his prescient grasp of the spacing of the planets' orbits Johannes Kepler in 1596, suspicious of the unusually large gap between Mars and Jupiter, predicted that a planet would be found there.

Johann Elert Bode was born in Hamburg, Germany, on 19 January 1747. Impressed by young Bode's prowess in mathematics, mathematician Johann Georg Büsch gave Bode, his doctoral student, access to his private library for study. Following some successful early-career publications on astronomy he was invited to Berlin in 1772 by Johann Heinrich Lambert (yet another Johann!) to help with ephemeris calculations. He was appointed director of the Berlin Observatory in 1786 – a post he held for nearly 50 years until his retirement! He died in Berlin, Germany on 23 November 1826 aged 79.

Bode was also famous in another respect: after William Herschel's discovery of Uranus in 1781 Herschel, having just been given a patronage by King George III, wanted to name the new planet Georgium Sidus, the "Georgian Planet", in honour of his new patron but this wasn't internationally acceptable. In 1782 Bode argued that since, in mythology,

Planet	Whole Number	TBL (AU)	Semi-major Axis (AU)	%age Difference
Mercury	**0**	**0.4**	**0.387**	**3.30%**
Venus	**1**	**0.7**	**0.723**	**-3.23%**
Earth	**2**	**1.0**	**1.000**	**0.00%**
Mars	**4**	**1.6**	**1.524**	**4.87%**
Ceres † (Dwarf Planet)	**8**	**2.8**	**2.77**	**1.08%**
Jupiter	**16**	**5.2**	**5.204**	**-0.09%**
Saturn	**32**	**10.0**	**9.583**	**4.26%**
Uranus	**64**	**19.6**	**19.218**	**1.97%**
Neptune			**30.110**	
Pluto ‡ (Dwarf Planet)	**128**	**38.8**	**39.48**	**-1.74%**
90482 Orcus ● (Dwarf Planet)			**39.17**	**-0.95%**

Table 1: Titius-Bode law (TBL) calculations and comparison with the actual semi-major axis distances.

† Ceres is very close to the mean distance of asteroids from the Sun.

‡ Pluto hadn't been discovered when the Titius-Bode law was devised and is now considered to be a dwarf planet.

● Orcus is the second-largest plutino after Pluto. It has a moon called Vanth.

Saturn was the father of Jupiter then the name of Uranus, the father of Saturn, should be used for the new planet. This gained wide acceptance and support for other proposed names rapidly dwindled. HM Nautical Almanac Office, however, didn't change the name from Georgium Sidus until as late as 1850!

Fascination with the law devised by Titius led to formation in 1800 of the United Astronomical Society (nicknamed the Celestial Police). This was a group of 24 European astronomers who took on the major tasks of:

a) A coordinated search of the sky for the planet that the Titius-Bode law suggested should be there,
b) improvement of star catalogues
c) attempts to measure stellar parallax (to determine the distance to stars) and
d) studies of variable stars and novae.

In furtherance of (a) above it was decided to monitor an approximately 15° wide strip around the ecliptic and centred on the ecliptic. The observing group was nominally composed of 24 astronomers with each being tasked to regularly observe a 15° longitudinal section along the ecliptic as far as the Sun's position on the ecliptic would allow.

Although a member of the celestial police, Giuseppe Piazzi, who was at the time working independently from the group, discovered on 1 January 1801 a small, moving "stellar object". Although Piazzi couldn't see any nebulosity around the point of light he initially announced that he'd found a new comet. The Sun then got in the way of further observation but a new method of determining orbits from observations, developed by the mathematician Carl Friedrich Gauss, allowed recovery of the object after it had passed behind the Sun. The determination of the orbit also showed that it closely satisfied the vacant position at 2.8 AU given by the Titius-Bode law.

Further observations led to it being initially classified as a new planet and it was eventually given the name Ceres. Pallas (1802, Heinrich W. M. Olbers), Juno (1804, Karl Harding) and Vesta (1807, Olbers) were discovered soon after Ceres which gave some concerns about the usefulness of the Titius-Bode law if there were going to be several bodies associated with just one of the law's distance 'slots' from the Sun.

Starting at the end of 1845 with the discovery of Astraea (Karl Ludwig Hencke) and then, with growing frequency, others, it was realised that these 'planets' were, in fact, small bodies compared to the other planets and they were re-classified as minor planets or asteroids. We now know that there are many small bodies in the asteroid belt with as many as one million of diameter 1 km or more. However, the total mass of the asteroids in the asteroid belt is estimated at 2.39×10^{21} kg, which is just 3% of the mass of the Moon. In addition, Ceres, Vesta, Pallas and Hygiea, the four largest, contain an estimated 62% of the asteroid belt's total mass with 39% of the total from Ceres alone (now re-re-classified as a Dwarf Planet).

In 1913, Oxford astronomer Mary Blagg worked on a re-formulation of the Titius-Bode law that might improve the match between a sequence of numbers from her new formulation and the known planet semi-major axis distances. She came up with a more complex formula than the one for the Titius-Bode law that fitted well for both the distances of the planets from the Sun and also for the distances of some of the then known large planets' moons from their parent planet. Following further analysis she then derived a much simpler formula with the drawback that the fit wasn't quite as close. For her work she was one of the first five female astronomers to be admitted as a fellow of the Royal Astronomical Society in January 1916.

Blagg's paper[1] on the reformulation of the Titius-Bode law wasn't followed up by others at the time. However, in 1982, following the discovery of 17 more moons of the gas giants since Blagg's work, G. G. Lobban *et al* reviewed her formulation[2] and found that only five (1979 J1-2-3, S10 and S11) did not fit. They also concluded that further tweaking of some of the parameters in Blagg's formula was necessary to improve the fit and that, even though there was likely no theoretical significance to the close fit, the formula might still be useful.

3 Resonance

With the asteroids filling in for the 'missing planet' in the Titius-Bode law, and there being suspiciously good agreement elsewhere in the sequence, the question of whether some subtle physical process might be at the foundation of the curiosity has often been raised.

For a pattern in the planets' spacing to develop and persist it suggests some 'organising force' is at play. The obvious contender for this is gravity – other forces are too weak at long distances – but exactly how does gravity play its part? Before answering that I need to talk about resonance.

What is resonance?

Many systems have a natural frequency of oscillation by, for example, vibrating, swinging, carrying waves, electrical circuits, changing electric and magnetic fields or flipping quantum properties. If you try to force a system to oscillate at a frequency other than its natural resonant frequency then it's hard work but oscillation at the resonant frequency can require little effort.

Think of pushing a small child on a playground swing: small pushes on the swing seat when it's nearest to you will maintain the size and rhythm of the swinging motion but pushing the seat at the wrong time, against the direction of the seat's motion, will decrease the size of the swing. In the former case your pushes, applied at a time when the swing is motionless at the extremes of its swing, only need to be sufficient to overcome the friction and drag forces in each cycle of the oscillation to grow or sustain the swinging motion. In the latter case you'd be trying to apply force to overcome the swing's natural motion to force it to swing in the way *you* want it to swing and that requires much more work. As a corollary, trying to force a swing to move with a frequency different to the natural resonant frequency is hard work – you'd have to grip the seat and run backwards and forwards!

Of course, only pushing the swing seat on alternate swings or every third or fourth swing might also maintain the swinging motion but it would be less effective (and may not be enough to overcome the frictional and drag forces).

The point of the above child's swing example is that even small forces, periodically applied at the right time, can increase or maintain an oscillation whereas applying a force at the wrong time may dampen an oscillation.

As examples, recall the London Millennium Footbridge that initially opened on 10 June 2000 but, almost immediately, had to be closed because the bridge swayed sideways as people walked across it. The natural sway of peoples' walking caused the bridge to sway, people adjusted their gait to accommodate the bridge's sideways movement and their (now synchronised) footsteps just amplified the effect on the bridge and made it sway even more. Its closure lasted two years to make structural modifications to dampen out the movement.

Also, the Broughton Suspension Bridge which collapsed on 12 April 1831 as 74 soldiers marched four abreast across the bridge. Their synchronised marching steps caused the bridge to vibrate and collapse; the British Army

issued standing orders that thereafter soldiers must 'break step' when crossing bridges.

4 Orbital Resonance

As well as the general types of resonance listed above there are also three principal types of orbital resonance[3,4], effects interplaying between bodies in the Solar system:

Spin-orbit resonance: This is otherwise known as spin-locking or tidal-locking. It occurs when any asphericity (lumpiness) in the shape of an orbiting body (the secondary, *e.g.* planet or moon) interacts with any asphericity in the shape of the primary (*e.g*. Sun or planet). The respective 'lumps & bumps' on the two bodies exert a gravitational pull on each other that works to make the axial rotation rate of the secondary a whole-number ratio of its orbital period. The gentle interchange of orbital and rotational energy may also cause the distance between the primary and secondary to change slowly.

The most well-known example of spin-orbit resonance is our own Moon which exhibits 1:1 spin-orbit resonance with one rotation on its axis for every one rotation about the Earth (which is why we always see the same face of the Moon). Because the Moon raises tides on Earth (not just the oceans but also small bulges in the Earth's crust) the effect is to gradually slow the Earth's rotation and lengthen its day by about 2.3 ms *per* century and increase the distance to the Moon by 3.8 cm *per annum*.

Another example is the Pluto-Charon system where the two orbit each other around a centre-of-gravity that's outside the body of Pluto and both keep the same face pointing towards the other. This is a more extreme version of the 1:1 spin-orbit resonance than for the Earth-Moon system where only the Moon is spin-locked so that the same hemisphere always faces the Earth. The same mutual spin-locking effect also applies to the Eris-Dysnomia system.

In fact, all large moons in the Solar system (and some smaller ones such as Phobos and Deimos) are 1:1 spin-locked to their respective primary planet.

A further example is the rotation of Mercury[5]. Mercury orbits around the Sun in 87.9691 days and rotates on its axis once every 58.646 days. If you divide the former period by the latter (87.9691/58.646) you get 1.5000017 which is the fraction ³⁄₂. Within the limits of observational accuracy this is a 3:2 ratio showing that Mercury has a 3:2 spin-orbit resonance and rotates on its axis three times for every two orbits around the Sun.

While a system may slowly converge towards an overall spin-locked configuration over a long period of time there is the possibility for small, relatively short-period wobbles in the axes of the primary and secondary that cancel out over a time period that's short compared to the time taken for spin-locking to develop. In the case of our Moon, this wobbling contributes to the factors we collectively call Libration and which allow us to see about 59% of the Moon's surface from Earth.

Secular resonance: This is when the orbits of two bodies precess in a synchronised way. Typically there are two types of such secular resonance:

a) Rotation of each orbit about its own perpendicular so that the direction of periapsis for each of the two bodies changes at the same rate (see video[6]).
b) Rotation of each orbit so that the longitude of the ascending node for each orbit changes at the same rate (sorry, no video).

Both types of synchronised precession can lead to the smaller body's orbital inclination and eccentricity changing. Some asteroids that are affected by Saturn causing a secular resonance may have their orbital eccentricities increased until, near perihelion, they pass close to Mars and may either be ejected from the Solar system or perturbed into a shorter-period orbit.

Mean Motion resonance: This form of resonance is one with which astronomers are more familiar as gaps in the asteroid and Kuiper belts and gaps in the rings of Saturn.

Consider two bodies orbiting the Sun where one has a one year period and the other a two year period (see figure 1). At the beginning, t=0, they are closer together than at any other time in their orbits and they exert a perturbing force on each other. At all other times they're further apart and spaced around their orbits so that any small perturbing forces are directed in different directions. It's not until two years later than they once again line up and there's a repeat of the perturbing force that occurred at the beginning.

The effect of the above is to apply a consistent change to both orbits in the same place and in the same direction. If one of the bodies is significantly

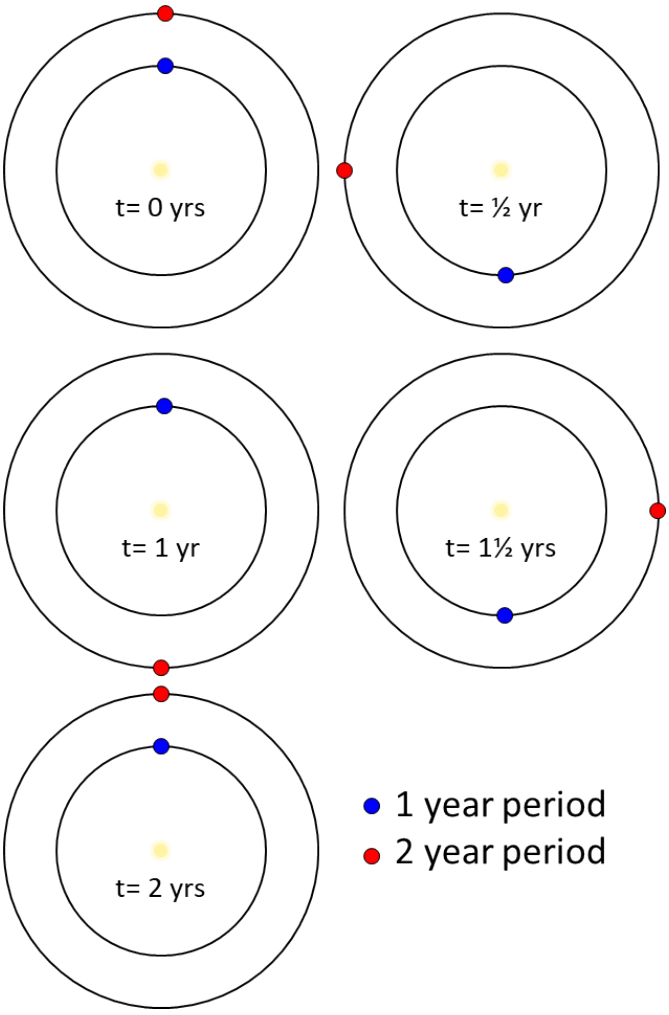


Figure 1 Mean motion resonance of two bodies

more massive than the other then the effect upon the less massive body is much greater than for the large body and the smaller body's orbit will be disproportionately affected.

The key factor here is the ratio of orbital periods that are pairs of whole numbers (usually small) that don't have a common divisor. Examples are: 1 & 2, 2 & 3 and 4 & 5. This is most evident in the asteroid belt where periodic gravitational 'tugs' by Jupiter (orbital period 11.86 years) on asteroids between Mars and Jupiter that would otherwise be orbiting with simple fractions of Jupiter's orbital period are cleared out of their orbits (see figure 2).

The 2:1 resonance is where an asteroid would orbit twice as faster as Jupiter, an asteroid at the 3:1 resonance would orbit three times faster and at the 5:2 resonance the asteroid would orbit five times for every two Jupiter orbits. Figure 2 also shows other, unlabelled, notches in the histogram that also the consequences of mean motion resonance with Jupiter.

Another example is gaps in the rings of Saturn (see figure 3) which have been produced by some of Saturn's moons. The large gap nearly three-quarters of the way from the left-hand edge of the image is the Cassini division discovered in 1675 by Giovanni Cassini at the Paris Observatory in a modest 2.5" refractor. Many other divisions can be seen in the rings[7].

There are both some exact and some approximate mean motion resonances between some of the moons of the larger planets (see lower half of figure 4):

4:2:1	Io-Europa-Ganymede	Jupiter's moons
2:1	Mimas-Tethys	Saturn's moons
2:1	Enceladus-Dione	"
5:3	Dione-Rhea	"
4:3	Titan-Hyperion	"
3:1	Miranda-Umbriel	Uranus' moons
5:3	Ariel-Umbriel	"
2:1	Umbriel-Titania	"
3:2	Titania-Oberon	"

Those in red are approximate resonances.

There are also some approximate mean motion resonances between the planets[4] (see second diagram in figure 4); as an example, Venus and Earth are in an approximately 8:13 ratio where, for every 8 years of Earth orbits, Venus orbits *approximately* 13 times returning to be about 1.5° away from exact alignment. After 120 cycles (960 years) Venus would be on the opposite side of the Sun from Earth (1.5°×120=180°). There is, of course, still an 8:13 mean motion resonance over a short period of time but a longer period highlights the inaccuracy of that resonance.

5 Exoplanets

Figure 4 also shows (top-diagram) the planetary system of pulsar PSR1257+12 with a 3:2 resonance between its planets A and B. There are several other exoplanets known to be in resonance (see table 2 overleaf):

Continued overleaf...

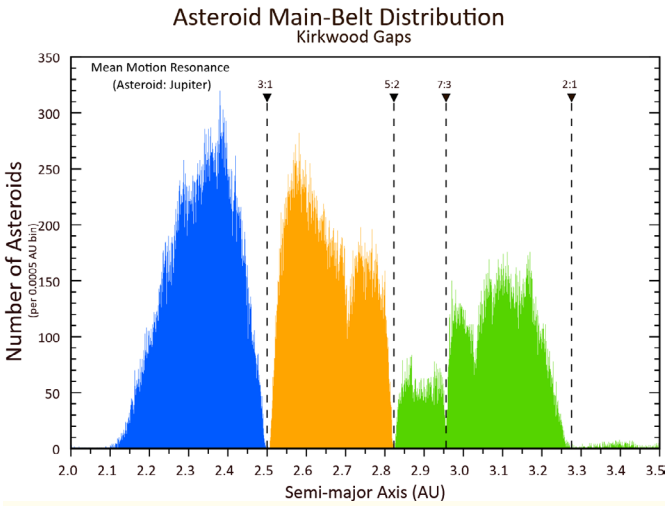


Figure 2: The Kirkwood Gaps

***Credit**: Based on a plot by Alan Chamberlain, JPL/Caltech*

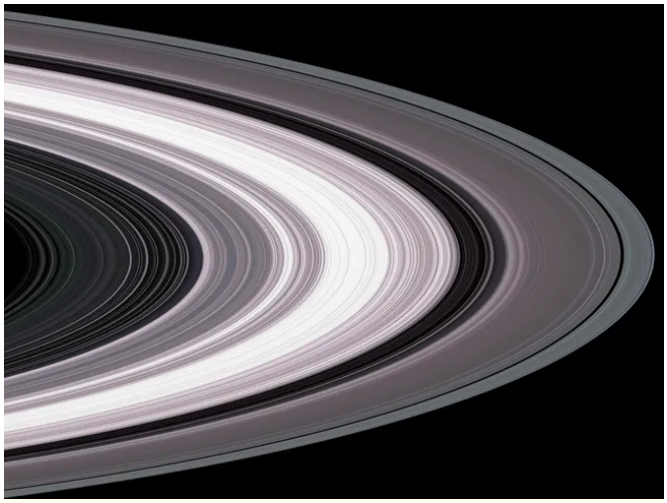


Figure 3: The rings of Saturn showing gaps induced by mean motion resonance.

***Credit**: NASA/JPL*

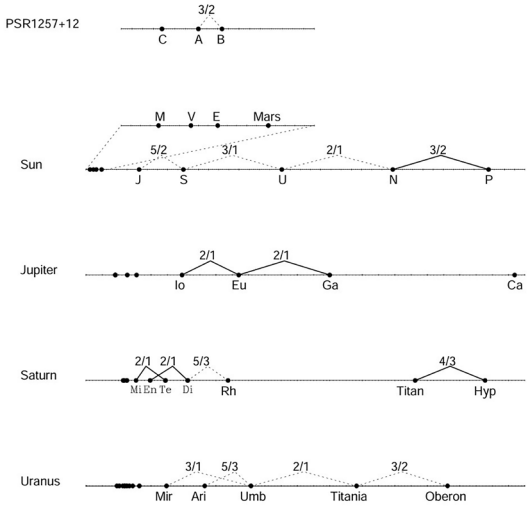


Figure 4: The relative orbital spacing of major planets and satellites of the Solar system. Exact mean motion resonances are indicated by solid lines; near-resonances are indicated by dotted lines. The planetary system of the millisecond pulsar, PSR1257+12 is also shown.

***Credit:** Renu Malhotra*
Orbital Resonances and Chaos in the Solar System

Continued from previous page

Star	Planets	Resonance Ratios
Gliese 876	c, b and e	1:2:4 (Laplace resonance)
Kepler-223	b, c, d and e	3:4:6:8
Kepler-80	d, e, b, c and g	4:6:9:12:18 (rotating frame)
TOI-178	c, d, e, f and g b	2:4:6:9:12 With a slightly larger orbit it would be in a 3:5 resonance with planet c.
TRAPPIST-1	b, c, d, e, f, g and h	5:8, 3:5, 2:3, 2:3, 3:4 and 2:3 near resonances between neighbouring pairs. Longest resonant chain known. Likely to be stable over billions of years.
Kepler-29	b and c	7:9
Kepler-36	b and c	6:7 near resonance
Kepler-37	b, c and d	5:8:15 near resonances
Kepler-90	b:c, c:i and i:d d, e, f, g and h f, g and h	4:5, 3:5 and 1:4 near resonances 2:3:4:7:11 near resonances 3:5:8 near resonances
HD 41248		5:7 near resonance (within 0.3%). Two super Earths.
K2-138	b, c, d, e, f g	3:2, 3:2, 3:2 and 3:2 near resonances between neighbouring pairs. Possibly the sixth planet has another 3:2 ratio with planet f.
K2-32	e, b, c and d	1:2:5:7 near resonances
V1298 Tauri	c, d and b e	1:2:3 near resonances May be in resonance with planet b.
HD 158259	b, c, d, e and f g	3:2, 3:2, 3:2 and 3:2 near resonances Possible sixth planet also with near resonance ratio of 3:2.
Kepler-1649	b and c	9:4 near resonance
Kepler-88	b and c	1:2 near resonance
HD 110067	b, c, d, e, f and g	54:36:24:16:12:9 resonances

Table 2: Stars with exoplanet resonances

6 Summary

Clearly, table 2 shows that resonance effects aren't confined to our own solar system but appear to be a common feature of many star systems. Investigating resonances may tell us more about the dynamics of how bodies formed within proto-planetary discs, how they 'shuffle' themselves around by dint of their mutual gravitational interplays and, ultimately, might give us clues to the formation of those bodies.

Bringing us back to the Titius-Bode law, is there any confirmed theoretical link between it and what we now know about resonance within our solar system? Well, it appears not but that *doesn't* mean that the Titius-Bode law is *just* a curious coincidence – I leave it as an exercise for the reader… :-)

Paul Daniels FRAS

7 References

1 *On a Suggested Substitute for Bode's Law*, M. A. Blagg, https://academic.oup.com/mnras/article/73/6/414/1075034, MNRAS, Volume 73, Issue 6, April 1913

2 *A Review of Blagg's Formula in the Light of Recently Discovered Planetary Moons and Rings*, G. G. Lobban, A.E. Roy and J. C. Brown, https://articles.adsabs.harvard.edu/pdf/1982JBAA...92..260L, J Brit astron Assoc.

3 *Orbital resonance*, https://space.fandom.com/wiki/Orbital_resonance

4 *Orbital resonance*, https://en.wikipedia.org/wiki/Orbital_resonance, Wikipedia

5 *A pre-Caloris synchronous rotation for Mercury*, https://arxiv.org/pdf/1112.2384, Mark A. Wieczorek *et al*, 11-Dec-2011

6 *Orbital Mechanics 101: Secular Resonances demo video*, https://www.youtube.com/watch?v=WuuPoNZvThQ, Matt Clement

7 *Rings of Saturn*, https://en.wikipedia.org/wiki/Rings_of_Saturn, Wikipedia

Mid-Kent Astronomical Society

Mid Kent Astronomical Society do not meet in August.
Although the Speaker Programme for September is not ready, here are the dates for meetings:

13 September 2024

27 September 2024

11 October 2024

25 October 2024

Meetings are held at Bredhurst Village Hall from 8:00 pm

Bredhurst Village Hall
Hurstwood Road,
Bredhurst, Gillingham,
Kent ME7 3JZ

Dave Merrall
Press Secretary
Mid-Kent Astronomical Society

Please visit our website: midkentastro.org.uk/events for more information

Readers Images: Bill McSorley

This is Melotte 111, The Coma Star Cluster, in the northern constellation of Coma Berenices. It is a target that I have wanted to image for a long time.

The Coma Star Cluster is a very large, nearby open cluster. The cluster contains about 40 brighter stars (between magnitudes 5 and 10) with a common proper motion, meaning all of the stars move together, suggesting they were all formed at the same time from the same molecular cloud. The cluster is spread over a huge region (more than five degrees across) near Gamma Coma Berenices; it has such a large apparent size because it is relatively close, only around 280 light-years away.

Coma Berenices is named for Queen Berenice II of Egypt who, in 246 BC, sacrificed her hair to the goddess Aphrodite to ensure the safe return of her husband, King Ptolemy III, from battle. Her hair disappeared from Aphrodite's temple, but court astronomer Conon of Samos claimed he could see where it had been placed among the stars in the region of the constellations Bootes, Leo, and Virgo.

To capture the full extent of the cluster, I used my relatively wide-field imaging setup to form a mosaic of four slightly overlapping images to give a field-of-view of around 6deg x 5deg. To further emphasise its size, an image of the moon from the same night has been superimposed in the top corner to give a sense of scale. This wide-field view also contains several deep-sky objects which I have annotated using PixInsight.

Imaged using a ZWO ASI1600MM Pro cooled astro camera through a SharpStar 61EDPH II triplet refractor.

Each panel comprising:

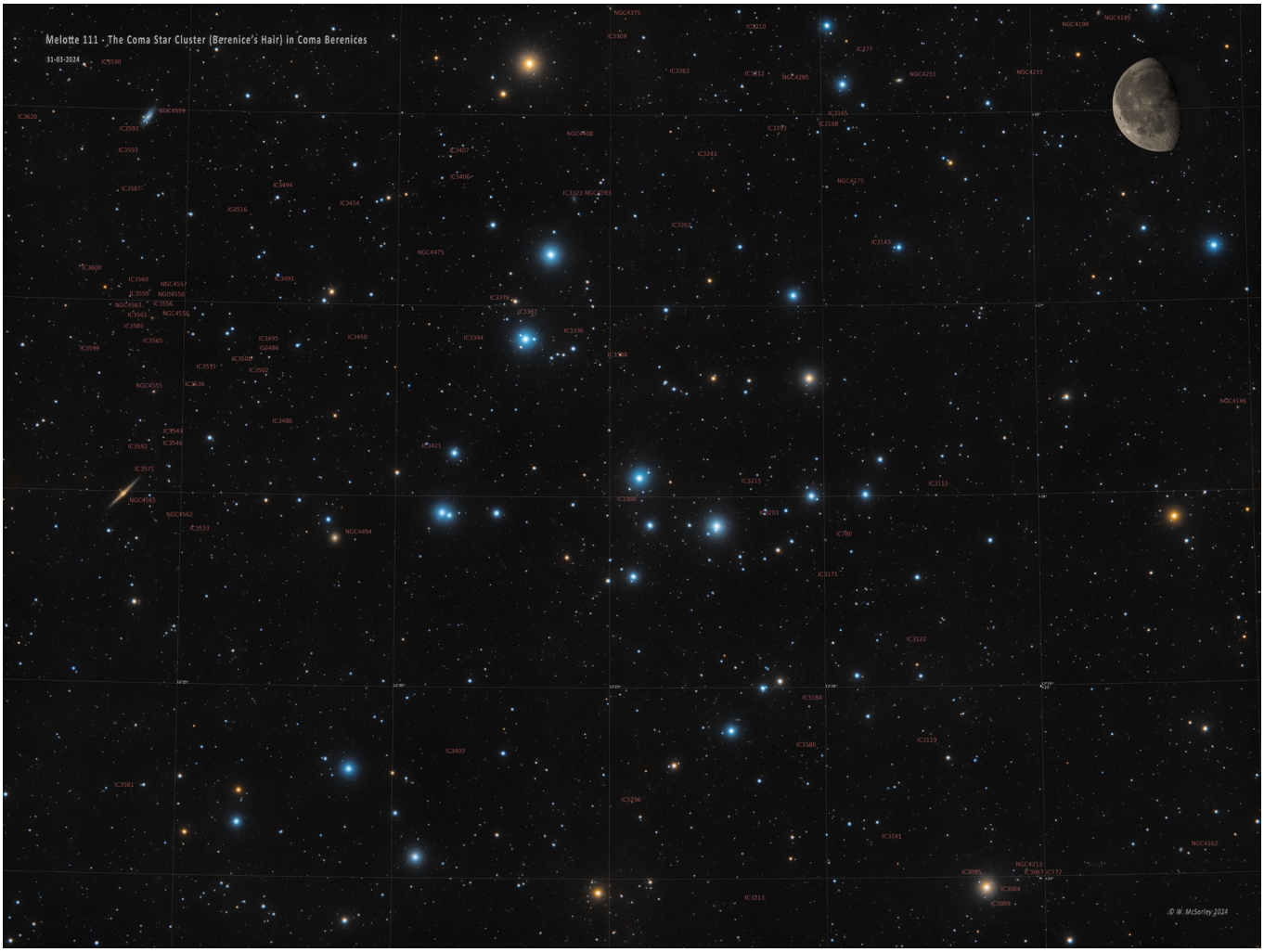
40x20sec exposures through a Luminance filter

40x40sec through Red, Green and Blue filters

matching Flats, Darks and DarkFlats (a total of just over 5hrs of integration).

Processed in PixInsight and finished in Photoshop.

Bill McSorley



Loughton Astronomical Society

The Loughton Astronomical Society is the home of all things astronomical in West Essex. Guests are always welcome; just drop in to one of our Thursday meetings.

1 August

Professor Allan Chapman: Sir John Herschel, the Astronomer who Surveyed Two Hemispheres

Speaker's website https://en.wikipedia.org/wiki/Allan_Chapman_(historian)

22 August

Professor Nicholas Evans: Dark Matter

Speaker's website https://www.southampton.ac.uk/people/5wy8k6/professor-nicholas-evans

5 September

Dr Chris Crowe: The Hubble Space Telescope - 25 years of Discoveries

Speaker's website https://astrocrowe.com/

12 September

LAS Members leading Public Observing

Join the LAS looking at the night sky through telescopes and binoculars.

Scope doctor: bring your own scope to get the best out of it. Alternative programme if cloudy.

T

13 September

AstroKyds Junior Section

AstroKyds is the Junior section of the LAS. 6:30pm at St Mary's Church Hall

Astrokyds is a group for young astronomers (6 - 14 years) run by some of the LAS members. Activities include simple experiments, audience participation, demonstrations, show and tell, quizes, mythology of the constellations and, if clear, some real observing. We ask that a parent or carer stays with the child. See https://las-astro.org.uk/astrokyds.html

26 September

Dr Alfredo Carpineti: Topic TBA

Speaker's website https://www.theastroholic.co.uk/

The Loughton Astronomical Society is the home of all things astronomical in West Essex. Guests are always welcome; just drop in to one of our Thursday meetings.

Please visit: las-astro.org.uk

Hertford Astronomy Group

2024-25 Programme

(subject to change)

Wednesday 11 September
Roger O'Brien: Distance Scales

Wednesday 9 October
Sam Rolfe: Raman Spectroscopy and the search for life in the Solar System

Wednesday 13 November
Robert Connon Smith: So Simple a thing as a Star

Wednesday 11 Dececeber
Jill Stuart: The governance of the "Final Frontier"

Wednesday 8 January
Martin Lewis: Planetary Imaging at the Edge

Wednesday 12 February
Quentin Stanley: The Art of (Computer) Modelling

Wednesday 12 March
Mike Foulkes: Eclipses

Wednesday 9 April
David Southwood: A Decade as an ESA Director

Wednesday 14 May
Jerry Stone: AGM followed by Is Pluto a Planet? - 15 years since New Horizons flyby.

Wednesday 11 June
Kevin Fong: Living on the Moon

Unless otherwise stated, meetings are held at:
University of Hertfordshire, Lindop Building
College Lane, AL10 9AB

More details at: hertsastro.org.uk