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# Journal

of the

## Nottingham Astronomical Society

June 2023

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**Thursday, June 8<sup>th</sup>**

**Nottingham Emmanuel School  
Gresham Park Road,  
West Bridgford,  
Nottingham, NG2 7YF**

**7:45pm (doors open at 7:15pm)**

**This evening we welcome**

**Dr Phil Evans**

**of the University of Leicester**

**who will be presenting**

**Confessions of an X-ray  
Pyromaniac**

### **The Nottingham Astronomical Society: E - SERVICES**

Whether or not you are a NAS member, you can keep up to date with details of the Society's meetings and other events by visiting the NAS website:

[www.nottinghamastro.org.uk](http://www.nottinghamastro.org.uk)

#### **NAS on Facebook**

You are welcome to connect with other members and friends of the NAS on Facebook by going to: <http://www.facebook.com/nas.org.uk>

#### **NAS on Twitter**

The Society has a Twitter account at <https://twitter.com/NottinghamAstro>

#### **NAS Journal e-mailing list**

To register for your monthly e-mailed link to the NAS Journal, and a copy of our SkyNotes, just e-mail [secretary@nottinghamastro.org.uk](mailto:secretary@nottinghamastro.org.uk)

You don't have to be a Society member to take advantage of this service.

*If you happen to change your email address, please remember to inform the Society by emailing us at [treasurer@nottinghamastro.org.uk](mailto:treasurer@nottinghamastro.org.uk)*

## **Chairman's Message, June 2023**

Hello everyone.

Summer seems to be coming in at the moment, although by the time you read this the weather will probably have changed! The good news is that the observatory site has finally dried out, and you can get to the telescope without needing an amphibious landing craft. The bad news, as I'm sure you are aware, it doesn't really get dark at any reasonable time this time of the year! We hope to sort things out with the roadway, and are in talks with Severn Trent as to ways we could solve this. However in the meantime we have installed some new hardware, including an all sky camera, which you can see images from on the website. There is also a video of the previous day, where you can spot lots of alien like bugs landing on it, and the occasional bird!

The next meeting is on the 8th June, and we have an X-ray astronomer, Phil Evans visiting to tell us his confessions. They say in visual observing every photon counts; well in X-Ray astronomy, photons are few and far between, so every one is meticulously recorded. So his experiences should be interesting.

We have one more main meeting after that, where Don Pollaco returns in July, then August there is no meeting, but there is a social barbecue where you can come along and see the observatory and what has happened to it over the year.

Best wishes

**Julian**

## **BAA Summer Meeting at Nottingham**

You may remember the British Astronomical Association summer meeting was held in June 2022, and a two page report Richard wrote for the BAA Journal has been published and the BAA have kindly allowed us to reproduce it below.



# BAA One Day Summer Meeting, 2022 June 25 'Cosmology, Galaxies & Exoplanets'

held at the Maths & Physics Building, University of Nottingham, Nottingham NG7 2RD

**Dr David Arditti**, *President*

**Bill Tarver, Hazel Collett & Prof Jeremy Shears**, *Secretaries*



**Richard Severn**  
*Vice-chair,*  
*Nottingham Astronomical Society*

The British Astronomical Association 2022 Summer Meeting was held at the University of Nottingham and hosted by Nottingham Astronomical Society.

Despite a national rail strike, this first Summer Meeting of the Association since the pandemic was attended by over 40 people. The last BAA meeting to be held in Nottingham was a Back to Basics workshop on 10 Jan 30, also at the University, and before that an Observers' Workshop on 2004 Apr 24 was held at Nottingham High School for Girls. The 2022 meeting was appropriately held in the School of Physics & Astronomy, on the University Park Campus. Keen-eyed delegates will have noticed Einstein's Blackboard adorning the wall in the refreshments room; this blackboard shows calculations written by Albert Einstein during a lecture he gave on 1930 Jun 6 in the Trent Building at Nottingham University College (as it was then known).

Dr David Arditti, BAA President, opened proceedings and started with the presentation of the Sir Patrick Moore prize to Andrew Robertson. The award was in recognition of his lifelong enthusiasm for astronomy, arranging of star parties and educational outreach to groups over many decades.

The first talk of the day was by Prof Frazer Pearce from the University of Nottingham.

## 'Adventures in the Goldilocks Zone: the search for other Earths'

Prof Pearce commenced by showing a fascinating diagram depicting the formation of our early solar system, which explained the current order and positions of the planets. Using computer simulation, the relative positions of the early planets have been modelled, showing how they have migrated (inwards and outwards from the Sun) over time, mopping up most of the dust and matter from the early protoplanetary disc. Orbital resonance between Jupiter and Saturn eventually settled at a ratio of 3:2, which interestingly prevented further inward migration and actually causes outward migration away from the Sun.

Prof Pearce introduced the concept of the 'Nice scenario', where a fifth gas giant had a close encounter with Saturn, causing it to be thrown out of the solar system. This interaction broke the 3:2 resonance between the two gas giants, which would explain the orbital periods we see today. One of the supporting arguments for this theory is the abundance of water on Earth; the inward and outward migration of gas giants displaced cometary material, bringing water beyond the snow line into the inner solar system.

In considering the Goldilocks Zones of other stars, Prof Pearce described a system called TRAPPIST-1, containing seven planets of similar mass to the Earth. The star is much smaller than our Sun and these planets lie at a distance from the star comparable to being within the orbit of Mercury, though two do lie in the Goldilocks Zone and are thus expected to contain liquid water. Prof Pearce explained that, with the use of new and more detailed spectroscopic methods, we really are entering an era of detecting 'Earth-like' extrasolar planets, with detection of an Earth analogue inevitable in the next 20 years.

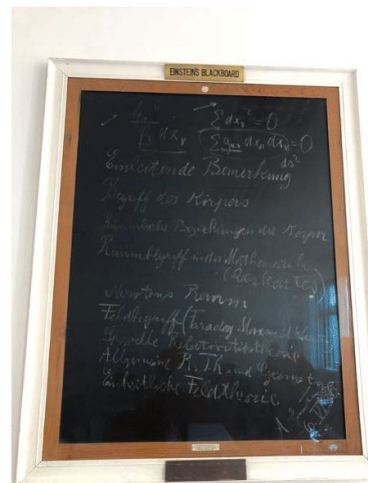
## 'Origins: The Universe to intelligent life & everything in between'

Prof Christopher Conselice from the University of Manchester opened his talk by giving a summary of what we know about the Universe in terms of composition and structure, as well as an overview of galaxy classification (more on that later).

The *Hubble* Ultra Deep Field image shows that as we look back further in time, galaxies are smaller, bluer, and more likely to be 'peculiar' (having distorted shapes), with more star formation compared to galaxies we see today.

Some of Prof Conselice's own research involves looking at galaxy mergers. The rate at which galaxies merge has changed over time, with mergers being much more frequent in the early Universe and less so now. It is hoped that data from the *James Webb Space Telescope* will help us understand more about galactic mergers.

Prof Conselice closed by discussing the probability of life elsewhere in our galaxy. The Drake equation has been criticised as it has many unknowns; Prof Conselice describes a simpler way to think about potential life elsewhere in the Universe. Using Earth as the only known example of a planet hosting intelligent life with the capability of communicating to other worlds, Prof Conselice explained how Astrobiological Copernican Weak and Strong Conditions (incorporating galactic star-formation histories, metallicity distributions and the likelihood of stars hosting Earth-like



Einstein's Blackboard, on display in the Maths Physics Building at the University of Nottingham (Richard Severn)

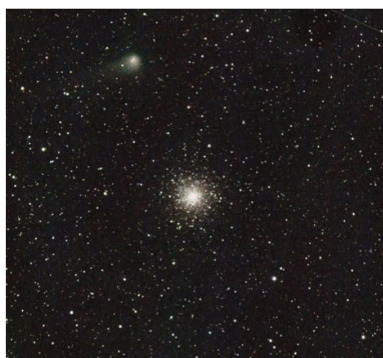


Attendees being welcomed at the beginning of the meeting. (Richard Severn)



Dr Arditti addressing the meeting. (James Dawson)





C/2017 K2 (PanSTARRS), imaged by Leigh Blake.

planets within their habitable zones) can be used to look for civilisations elsewhere in our galaxy. The number he came up with is 36. The closest would likely be 18,000 light-years away.

### 'Artificial intelligence (AI) for exploring the dark Universe'

Prof Ofer Lahav from University College London reminded us about the need for dark matter and dark energy in our current understanding of the Universe, but also how little evidence there is to explain what these are. Prof Lahav also highlighted that one of the problems with modern astronomy is dealing with immensely large datasets; petabytes of data per day from a single instrument. His work connects two distinct disciplines: cosmology, and artificial intelligence.

Rather than thinking of AI as artificial intelligence, Prof Lahav likes to think of it as Augmented Intelligence. Sub-disciplines within AI include big data, machine learning and deep learning; the principles have been around for several decades.

Prof Lahav talked about some of the applications of AI in cosmology where computers have been employed to classify galaxies: in detecting arcs which may represent gravitational lenses, in measuring the red shift of galaxies and in the use and application of decision trees. Interest in this field is growing at tremendous pace, with more and more papers being published all the time using AI and its derivatives.

### Papers accepted by Council on 2022 July 29

A paper was proposed by Prof Jeremy Shears, Papers Secretary, for publication in the *Journal* and it was duly accepted by virtual agreement of the BAA Council:

*Brightness variations in R CrA and NGC 6729*, by Grant Privett & Terry Evans.

Philip Jennings, Editor



The BAA President with members of Nottingham AS, young and old, in their observatory. (Barrie Chacksfield)

Prof Lahav closed his talk by showing some of the work of his PhD students, and describing PhD programmes which offer a year in a range of different industries, which has great appeal to students and also to the potential employers.

### 'Nottingham Astronomical Society'

The observatory director, James Dawson, gave a brief history of Nottingham Astronomical Society. It was founded in 1946, though there is evidence of amateur astronomy groups dating back to at least 1921. After outlining the main activities of the Society, James described the current project to revamp the observatory, which is located seven miles south of Nottingham and was built by members during 1980s and '90s.

### 'Galaxies – one gigayear at a time'

The chair of Nottingham Astronomical Society, Dr Julian Onions, delivered a talk he described as 'Galaxies 101'. Dr Onions started by illustrating the scale of our local neighbourhood through shrinking the Sun down to the size of a marble. If this marble was located in Nottingham, our nearest star, alpha Centauri (also the size of a marble), would be in Calais. Such separation between stars allows galaxies to pass through one another without stars ever colliding.

Dr Onions took us on a whistle-stop tour through the profuse number of galaxy types (some of which are very weird and wonderful). Importantly, he defined a gigayear – a billion years – and explained that this is the time frame required for something significant to happen in a galaxy.

We were shown one of the supercomputers he has used at the University of Nottingham, and Dr Onions outlined the calculations and processes involved in his simulation of the evolution of the early Universe using dark matter halos; even


with 2,600 CPU (which the old supercomputer had), these simulations still take a week or more to complete.

Julian concluded his 'Galaxies 101' by showing a simulation of stellar motion in our own galaxy using recently obtained *Gaia* data. This reveals a number of stars are destined to leave the galaxy, either because they were already just passing through, or because they had been flung out after interaction with the gravity well of our supermassive black hole.

### BAA Section updates

Directors of the BAA's Historical and Comet Sections, Mike Frost and Nick James, respectively, gave updates on the work of their two Sections. Mr Frost summarised the importance of historical research in astronomy and talked about some important names in the history of amateur astronomy. He finished by showing a picture of an observatory, thought to be in Australia, which the Historical Section is trying to identify. A picture of this observatory and the available information can be found on the BAA Forum.

Mr James reminded the audience that while most comets today are discovered by professional survey telescopes when they are far out and very faint, amateur observations of comets help professionals refine the orbits and our understanding of these wandering bodies. Comet of the month for July was C/2017 K2 (PanSTARRS), which members of Nottingham Astronomical Society imaged at their observatory passing close by M10 on 2022 Jul 15.

Special thanks were given to Hazel Collett and Dr Julian Onions for organising the BAA Summer Meeting. Thanks were also given to Cath and Rachel Onions and members of the Nottingham Astronomical Society for helping on the day. Recordings of the talks are now available on the BAA YouTube channel. 

# Sky Notes

## June 2023

Compiled by Roy Gretton



*All times given below are in British Summer Time*

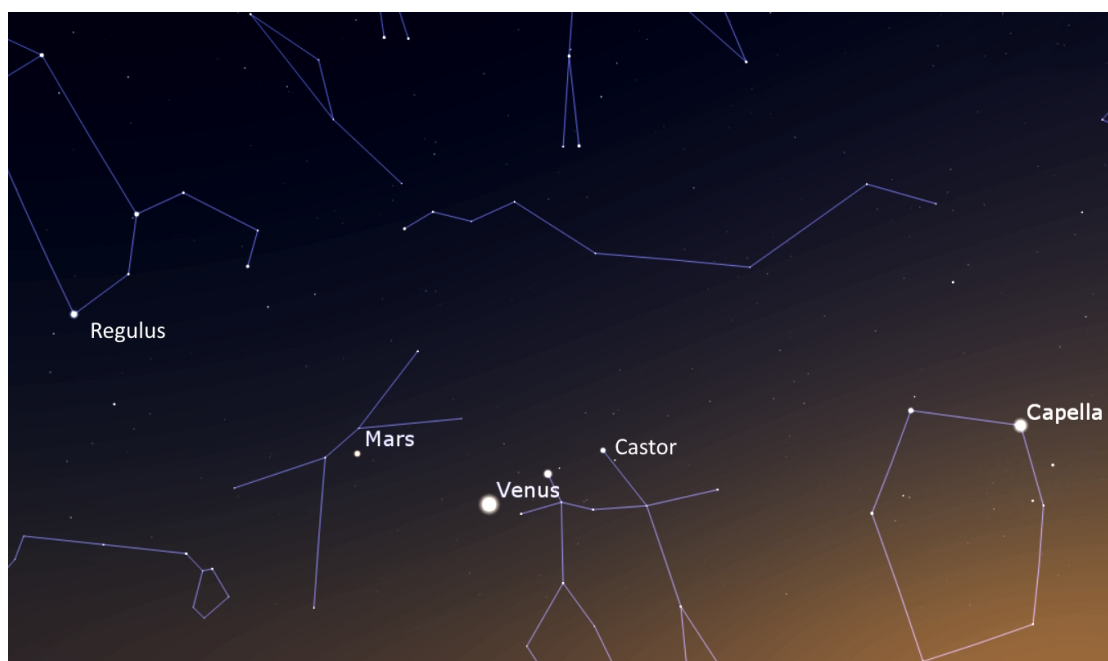
The Summer Solstice will occur at 3:58pm on June 21<sup>st</sup>.

### PHASES OF THE MOON

<i>Phase</i>	<i>Date</i>
Full Moon	June 4 <sup>th</sup>
Last Quarter	June 10 <sup>th</sup>
New Moon	June 18 <sup>th</sup>
First Quarter	June 26 <sup>th</sup>

This month the Moon is closest to Earth on the 6<sup>th</sup> and furthest on the 22<sup>nd</sup>.

### THE PLANETS

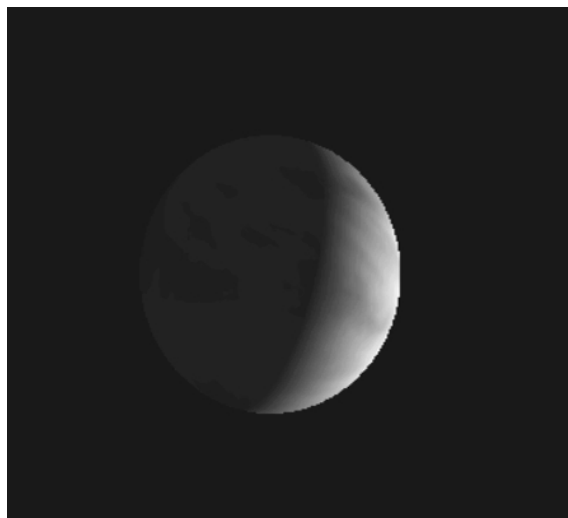


**Looking WNW at 10:45pm on June 1<sup>st</sup>**

*Venus has taken Mars' position, lined up with Pollux and Castor, while Mars has moved on into Cancer, and for the next couple of nights will be passing through the Beehive Cluster*

**Mercury** begins the month as a morning object 25 degrees from the Sun, then heads in toward superior conjunction which will occur on July 1<sup>st</sup>.

Before the end of this month **Venus** will have brightened to a spectacular magnitude -4.7, but by then it will be setting only 2 hours after the Sun, and will be relatively low in the sky after sunset.



Venus on June 30<sup>th</sup>, diameter 33 arcseconds

Tiny **Mars** will have an angular diameter of little more than 4 arcseconds by the close of this month, and will have faded to magnitude 1.7. However, on the first couple of nights of June it will be passing through the Beehive Cluster (far too low down to be visible from my observatory, but from more favoured locations should present an interesting photo-opportunity).

**Jupiter** is still struggling to break free of the pre-dawn glow, and by mid-June will be rising just before 3 am.

**Saturn** is now less than 11 degrees south of the celestial equator, and higher in our sky than it has been for some years. By mid-June it will be rising at 1 am.

**Uranus**, a morning object, is not well placed for observation this month.

**Neptune** is also a morning object, rising at 2 am in mid-June.

## METEORS

With its lack of true darkness, June is not the best time of the year for observing meteors, and there are no major showers during the month.

## NOCTILUCENT CLOUDS

We are now well into the NLC season. Noctilucent clouds are pale blue filamentary clouds, formed about 50 miles above the Earth's surface, far above the normal clouds we associate with the weather. They are best observed in June and July in the northern hemisphere, becoming visible when illuminated by the Sun when it is below the horizon. They are still poorly understood, but their pale blue-white appearance is quite distinctive. If you wish to see noctilucent clouds, look toward the north on a clear evening after 10:30 pm.

## DIARY DATES 2023

### Monthly Meetings of the Nottingham Astronomical Society

1. Meetings at  
Nottingham Emmanuel School  
Gresham Park Road,  
West Bridgford,  
Nottingham, NG2 7YF

Held on the **FIRST Thursday** of each month **(unless otherwise stated)**  
except **August**

Doors open at 7:15pm for 7:45pm start.

*These events are normally centred around a talk by a visiting speaker,  
except Quiz Nights, etc, when NAS members provide the activities.  
Normally we have a **Helpdesk** open at each meeting.*

Date	Topic	Speaker
*June 8 <sup>th</sup>	Confessions of an X-ray pyromaniac	Dr Phil Evans University of Leicester
July 6 <sup>th</sup>	Space Debris and Astronomy	Prof Don Pollacco University of Warwick
August 5 <sup>th</sup>	Barbecue at the Observatory	

**\*Note unusual date: second Thursday of the month**

### 2. Social and Practical Astronomy Meetings at the Burnside Memorial Hall, Plumtree

Church Hill, Plumtree, Nottingham, NG12 5ND  
Held on the **THIRD Thursday** of each month from **7:30pm**

*These meetings are of a more informal nature, providing opportunity for  
members and guests to share their hobby over a cup of tea or coffee,  
as well as listening to a short talk or discussion*

The next meeting will be on **June 15<sup>th</sup>**



## Social and Practical Astronomy, May 2023

### *Plumtree meeting-mingle on 18th May*

A productive, informal and interactive get together where members were showing their own Astronomy set-ups - inviting questions and sharing their knowledge & experiences. I was rather worried as despite requests prior to this meeting we were a little light on volunteers.

I needn't have worried as the NAS members came up trumps and loads of people brought their telescopes in. It all went rather well with many different types of telescopes on display and covering varying levels of experience. In fact, everyone was so engaged we kind of forgot the time and around 9:15 pm we realised that we had better start packing up!

It really was thoroughly enjoyable to get time to chat to other members new and old.

And a heartfelt 'thank you' to everyone who brought their telescopes in!



**Mark Fairfax**



## Venus at Dichotomy

Below is a message from the Mercury and Venus Section Director of the British Astronomical Association, **Paul Abel**, about a request for visual observations of Venus over the coming days. If you are not a member of the BAA and you make an observation of Venus, forward it to me and I will send on to Paul.

**James Dawson**

Observatory Director

[helpdesk@nottinghamastro.org.uk](mailto:helpdesk@nottinghamastro.org.uk)

Hi all,

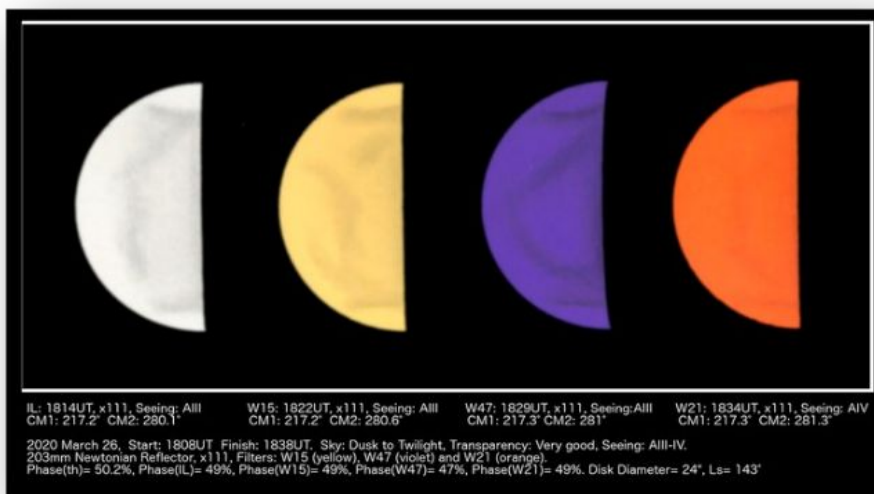
I hope this message finds you all well. Just a quick reminder that Venus will reach theoretical dichotomy on 4th June. However, due to the Phase Anomaly, the planet will reach actual dichotomy a number of days before then! On Sunday I measured the phase to be 54% so I expect Dichotomy to occur within the next 5 days or so.

One of the aims of the Section is to determine the exact date that Venus is observed to be 50% illuminated. This can only be done visually as the terminator is very soft in images due to terminator shading. Please keep an eye on Venus and try and determine when the planet appears exactly 50% illuminated. Please record the date and time (in UT) and send me your observations (ideally this should be a disk drawing, but just the date, time and telescope is fine if you don't wish to make a drawing).

A telescope of 90mm should be sufficient to see it and you might find a yellow filter helps make the terminator a little sharper.

Good luck!

Cheers,  
**Paul**



## Reflections on my First Year with an SCT

My new **11-inch aperture f/10 Schmidt-Cassegrain** telescope was delivered on 28<sup>th</sup> June last year, and was promptly installed in my new observatory. Various accessories arrived at about the same time, and I eagerly awaited darker nights to be able put things to the test. My previous scope had been an **11.75-inch f/5.3 Newtonian** reflector, for which I needed a stepladder to reach the eyepiece. The first useful fact I learned was that with the aid of a star diagonal on the SCT I was able to observe almost any part of the sky from the comfort of a chair. For someone approaching 80 years of age, this is a real boon.

In readiness for observing the opposition of Mars in December, I purchased a binoviewer which splits the light into two beams so that both eyes can take in the view. Both my eyes have defects (particularly my right one, which happens to be my dominant eye) but the binoviewer greatly enhances my viewing pleasure, as both eyes are able to work together, and defects in one eye are compensated for by the other.

In the early autumn I used the telescope mainly for deep sky imaging, but once Mars was well placed for evening observation I did very little photography, but used the binoviewer for studying planetary details – both Mars and Jupiter. I must have spent hours staring at Mars in December, finally giving up when I was in danger of freezing to the chair!

Then in January this year, with Mars receding fast, I returned to deep sky imaging, using the same Canon 450D DSLR that I'd been using since 2009. With a new telescope and a new Skywatcher Synscan drive, I was on what is commonly called a "learning curve". What definitely was NOT new was the preponderance of cloudy nights in an English winter!

Whenever I happened to be at home on a clear night I would be out in the observatory, but in spite of this I fulfilled only a fraction of my imaging programme due to the excess of cloudy nights. Here are some of the main points I learned (or, in most cases, re-learned).

**1. For successful imaging, the telescope must be pointed accurately at the target object.**

This is particularly important when imaging at f/10, as with an 11-inch scope the focal length is 2.8 metres. Fortunately the Synscan drive has a feature called Pointing Accuracy Enhancement (PAE) which provides extra precision even after an initial 3-star alignment. The software divides the sky into 85 small zones, and you can select a number of stars in the vicinity of your target object to enhance the pointing accuracy. So you pick your first reference object, a reasonably bright star, and look at the live view on the camera screen. Usually the star isn't precisely in the centre, so you nudge the drive system until it is exactly central, then use the PAE function on the handset. This causes the drive to remember the exact position of that star. You can then choose another reference star, again ensuring it is exactly in the centre of the camera viewer, and again use the PAE function. I usually go through this procedure a third time, finally choosing a star as close to my target as possible. I then instruct the mount to go to the deep sky target itself (usually invisible on the screen, but confident that it is there).

**2. The camera must be accurately focussed.** To help with this I made myself a Hartmann mask, a cardboard disk with three identical triangles cut into it. I bring this into play with one of the bright stars used for PAE. Thus I end up with a well-focussed camera pointing at my target object. I can then start the camera doing continuous 30-second imaging, finally combining the resulting images using Deep Sky Stacker.

**3. Precautions often need to be taken against dewing.** An SCT is more susceptible to dewing than is a Newtonian because the corrector plate at the front of the instrument is exposed to the outside air with almost no shielding. Among the accessories I purchased with the scope was a heated dew shield, but thus far I haven't used it, preferring to use a hairdryer. Once I've set the camera imaging I can retreat to the warmth of the house for about 30 minutes,

after which I need to go out and rotate the dome a few degrees. At the same time I take the opportunity to give the corrector plate a blast with the hairdryer if dew is starting to form.

4. Along with the telescope I purchased a focal reducer, so I have a choice of two focal ratios: f/10 or f/6.3. Imaging at f/10 is a much slower process but gives a larger image scale. Imaging at f/6.3 using the focal reducer is faster but suffers from severe vignetting. Deep Sky Stacker is supposed to be able to correct for this by using flat frames, but I haven't yet found this to be successful, so I usually crop f/6.3 images to remove most of the vignetting.

In order to collect sufficient data for some objects I've needed to image them on more than one night, and combine the images from several nights into one stacked end-product. The arrival of clouds often cuts an imaging session short, so on the next clear night I need to point the telescope at the same target object, with the camera oriented in exactly the same manner as on the previous night. To get the camera orientation right I move the scope back and forth for a short distance in RA and dec, and swivel the camera until the reference star moves parallel to the long side of the rectangle on the viewing screen. Unless this is done fairly accurately Deep Sky Stacker will be unable to stack the images from different nights.

All of this requires patience to avoid the disappointment of reaching the stacking stage and finding that **(a)** your target object isn't in the field of view, or **(b)** your images are out of focus, or **(c)** images of the same object taken on different nights can't be stacked.

There follows a short selection of images I've acquired so far. *Some of them are in need of more data, which I'm hoping to be able to collect next autumn and winter.*

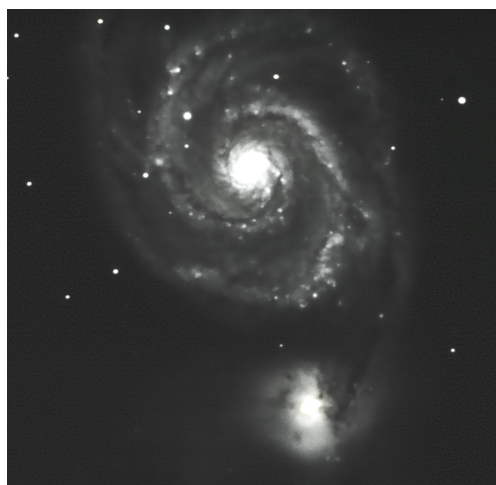
#### Images acquired at f/10



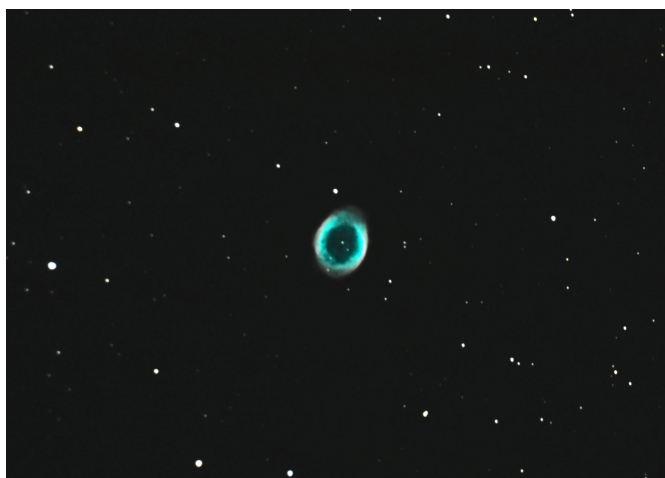
**M13** 5 min at ISO800



**M27** 49 min at ISO800



**M51** 132 min at ISO1600



**M57** 33 min at ISO800



**M82** 67 min at ISO1600

**Images acquired at f/6.3**



**M81** 100 min at ISO1600



**NGC4565** 72 min at ISO1600



**M42** 47 min at ISO 800

**Roy Gretton**



# Nottingham Astronomical Society

Affiliated to the **British Astronomical Association**  
Member of the **Federation of Astronomical Societies**  
Supporters of the **Commission for Dark Skies**

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**CHAIRMAN:**

**Julian Onions**

email: [chairman@nottinghamastro.org.uk](mailto:chairman@nottinghamastro.org.uk)

**VICE CHAIRMAN:**

**Richard Severn**

email: [vicechairman@nottinghamastro.org.uk](mailto:vicechairman@nottinghamastro.org.uk)

**SECRETARY:**

**Chris Sneddon**

email: [secretary@nottinghamastro.org.uk](mailto:secretary@nottinghamastro.org.uk)

**TREASURER:**

**Andrew Green**

email: [treasurer@nottinghamastro.org.uk](mailto:treasurer@nottinghamastro.org.uk)

**JOURNAL EDITOR:**

**Roy Gretton**

email: [journal@nottinghamastro.org.uk](mailto:journal@nottinghamastro.org.uk)

**MEMBERSHIP SECRETARY**

**Richard Severn**

email: [membership@nottinghamastro.org.uk](mailto:membership@nottinghamastro.org.uk)

**WEBMASTER:**

**Leigh Blake**

email: [leigh@nottinghamastro.org.uk](mailto:leigh@nottinghamastro.org.uk)

**OBSERVATORY DIRECTOR:**

**James Dawson**

email: [observatory@nottinghamastro.org.uk](mailto:observatory@nottinghamastro.org.uk)

**OTHER COMMITTEE MEMBERS:**

**Holly Gonzalez McNiven**

**Mark Fairfax**

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**Meetings**

Our formal meetings, often with an illustrated talk by a guest speaker, **normally** are held on the first Thursday of each month (except in August) at:

**Nottingham Emmanuel School**  
**Gresham Park Road,**  
**West Bridgford,**  
**Nottingham, NG2 7YF**

Doors open	7:15pm
<b>Meetings start</b>	<b>7:45pm</b>
Meetings end	9:15 pm

These meetings are open to the public, and visitors are welcome to attend, subject to a charge of £3 per meeting for adults.

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**Annual subscriptions 2023**

Full	£30
Joint rate for partners	
living at the same address	£45
Under-18s and full-time students	£5

Subscriptions become due on 1<sup>st</sup> January. Half-price subscription is charged if joining after 30<sup>th</sup> June (minimum subscription £5).

Please make cheques payable to:  
*Nottingham Astronomical Society.*

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If you would like more information about the **Nottingham Astronomical Society**, or would like to become a member, please contact the Secretary [secretary@nottinghamastro.org.uk](mailto:secretary@nottinghamastro.org.uk) or speak to any NAS committee member at one of the regular monthly meetings.

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**The Nottingham Astronomical Society**

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