# Journal

of the

## **Nottingham Astronomical Society**

**December 2020** 



## Our December "Gotham" meeting will be broadcast on Zoom

In a change to our normal YouTube live stream format, **this meeting will be on ZOOM only**, at the request of our speaker. The meeting will start at 8pm.

Members will be sent details of how to log into zoom before the meeting.

Please note there will **not be a recording** of this meeting. Members will be required to watch the meeting live.

## Chairman' Message – December 2020

Dear all,

Well, here we go again in lockdown! That's put a stop to our progress at the observatory, though social distancing meant Rob and I weren't getting far very fast. We managed to get a few webcam videos of Mars with the 24" telescope, though in rather mediocre conditions. We were also on a learning curve with Firecapture and the latest version of Registax. Leigh gave a hand at home with some processing to make the best of what we had, thanks Leigh. We'll carry on when restrictions allow – probably in the new year. Meanwhile Mike's got his new EvScope and has been trying it out with some success. It should make a great tool for outreach, alongside other members' conventional scopes, so he's welcome to join our outreach team and bring it along – when the pandemic is over!

Our online meetings go from strength to strength, we had a very informative talk from Damian Peach in November on Astrophotography, which stirred a lot of discussion. Then mid-month Julian and James gave an interesting talk on Double Stars, with Richard and Leigh in the backroom – that really does make a big difference to the appearance of the presentations, which is attracting a wide audience and putting NAS on the map! They really do need contributions from members to keep them going – if you can help in any way please contact our <u>secretary@nottinghanastro.org.uk</u>

I have just completed **our speaker programme for 2021** – see page 5. January will be our AGM, postponed from November, but still on line. The first third to half year will probably continue on line, so I've saved our regulars like Ian Morison, Steve Barrett and Paul Money for later on. However that also means I've been able to get us a special treat for February, the well known broadcaster Professor Jim Al-Khalili, who is able to give us an online talk without travelling up from the deep south! Don't miss our December meeting, when Paul Money talks about the Vikings!

That's it for now, please take care – and stay safe.

## John

John Hurst, Chairman.

## 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: <u>www.nottinghamastro.org.uk</u>

#### **NAS on Facebook**

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

#### 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 email <u>secretary@nottinghamastro.org.uk</u>

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

## Sky Notes December 2020



#### **Compiled by Roy Gretton**

All times given below are in Universal Time (Greenwich Mean Time)

The Northern Hemisphere Winter Solstice occurs on the morning of December 21st.

## PHASES OF THE MOON

Phase	Date
Third Quarter	December 8 <sup>th</sup>
New Moon	December 14 <sup>th</sup>
First Quarter	December 21 <sup>st</sup>
Full Moon	December 30 <sup>th</sup>

This month the Moon is closest to Earth on the 12<sup>th</sup>, and furthest on the 24<sup>th</sup>.

#### THE PLANETS

**Mercury** should be regarded as unobservable this month, as it spends most of the time south of declination -20 degrees, and at an elongation from the Sun of less than seven degrees.

**Venus** continues to be visible low in the southeast in the early morning even though it spends the whole month to the south of declination –14 degrees. In mid-December it will be rising two hours before the Sun, at an elongation of 24 degrees, and through a telescope will present a broad gibbous phase.

**Mars** is an evening object in Aries, culminating at 8:30pm as December begins, and shining at magnitude -1. It will fade to magnitude -0.3 by the end of the month, as the angular diameter diminishes from 14 arcseconds to little more than 10 arcseconds. The best telescopic observing opportunities of the current apparition will definitely be over by then!

As December begins, **Jupiter**, very low in the southwest, will be setting three hours after the Sun. By the end of the month, this will have diminished to 1½ hours, as Jupiter heads toward conjunction with the Sun on January 29<sup>th</sup>. But before that, a more interesting conjunction will take place: that of Jupiter and Saturn. Throughout the first three weeks of December, Jupiter will be getting closer to Saturn, until on the early evening of the 21<sup>st</sup> the two planets will be a mere 0.1 degree apart. If you hope to observe this event, you will need to be in a location with a clear southwestern horizon.

In early December, Jupiter (magnitude -2.0) will be setting only minutes ahead of **Saturn** (magnitude +0.6). Through a telescope, seeing any detail on the Saturnian disk or in the rings will be very difficult due to the many miles of thick atmosphere that the light must traverse from such a low object. The main point of interest, when the sky is sufficiently clear, will be watching the two planets get closer and closer together as they move toward conjunction on the  $21^{st}$ .



Saturn, Jupiter and their satellites at 5pm on December 21<sup>st</sup>

**Uranus**, magnitude 5.7, in the constellation of Aries, is well placed for observation in the evening throughout December.

**Neptune**, shining at magnitude 7.8 and having an apparent diameter of 2.8 arcseconds, is observable through a telescope in the evening sky. It will be setting at 10pm by the end of December.

#### **METEORS**

The **Geminids** are the most abundant meteor shower of the year, producing over 100 events per hour under ideal conditions. The radiant of the shower, close to the star Castor, is above the horizon for the whole night in December, so Geminids may be seen at any time after darkness falls (although the radiant doesn't reach its highest point until after 1 am, so a midnight vigil should yield greater rewards).

**This year conditions are could hardly be better**, with peak meteor activity expected on the night of the **13<sup>th</sup>-14<sup>th</sup>**, within hours of the New Moon. But note also that some Geminids may be seen for a week either side of the maximum.

Of course there is the small matter of the weather! December nights can be *cloudy* (for which we have no remedy) and if clear are likely to be *cold* (the remedy for which is to wear sufficient layers of warm clothes as you settle into your recliner and gaze skywards).

## **DIARY DATES 2020-21**

## Monthly Meetings of the Nottingham Astronomical Society

## There will be no meetings at Gotham or Plumtree until further notice

We nevertheless continue to display our pre-arranged programme of speakers in the hope that it may be possible to livestream these talks.

## Members of the Society will receive further updates each month from the Chairman

Date	Торіс	Speaker
December 3 <sup>rd</sup>	<b>The Vikings at Barsoom</b> Part 1 Orbital Operations	<b>Paul Money</b> FRAS, FIBS
January 7 <sup>th</sup>	Annual General Meeting for 2019-2020 with election of Committee for 2021	
February 4 <sup>th</sup>	NAS New Year Special: The World According to Physics	<b>Prof Jim Al-Khalili</b> Well-known author and broadcaster
March 4 <sup>th</sup>	Exploring Mars Planning the next missions	Dr Steve Banham Imperial College, London
April 1 <sup>st</sup>	Astronomical Adventures in Tenerife	Dave Eagle
May 6 <sup>th</sup>	Extremophiles Why there must be life elsewhere in the Universe	Dr Martin Braddock AstraZeneca UK
June 3 <sup>rd</sup>	Harbingers of Doom? Comets	<b>Prof lan Morison</b> Emeritus Gresham Professor of Astronomy
July 1 <sup>st</sup>	The JUICE Mission Exploring Jupiter's icy moons	<b>Dr Chris Arridge</b> Lancaster University
August 7 <sup>th</sup> (Saturday)	Annual Barbecue at the Observatory (Members and their guests only)	
September 2 <sup>nd</sup>	<b>The Vikings at Barsoom</b> Part 2: The Search for Life	<b>Paul Money</b> FRAS, FIBS
October 7 <sup>th</sup>	Fiat Lux 3 The Large Synoptic Survey Telescope	Dr Steve Barrett University of Liverpool
November 4 <sup>th</sup>	Annual General Meeting with a Wine and Cheese Social	
December 2 <sup>nd</sup>	The NAS Christmas Lecture to be confirmed	

## Social and Practical Astronomy, Plumtree, December 2020

The **November** Plumtree meeting was devoted to <u>double stars</u>. Julian and James gave a talk about one of this group of deep sky targets which are often neglected and overlooked.

It is hoped the talk educated us about the difference between optical doubles and binary doubles, a very brief history in double star observing and why they continue to be observed today and what they tell us. Finally we heard about how double stars can be observed and given the details of some doubles we can all try and observe.

Julian mentioned the story about how Messier 40 got into the Messier catalogue and how Professor Mike Merrifield, our patron, had published on this topic. That short paper can be found <u>here</u>.

The whole talk can be watched again on the NAS YouTube channel.

There were plenty of questions after the talk which is great to see, and during the questions Richard displayed some live images of Mars from his Celestron C11 which he managed to capture.

Below you can see a small image of Mars (bottom left) which is a stacked image Richard processed quickly for us which shows the south polar cap at the bottom, and the dust storm near the south polar cap, at about the 5 o'clock position. The larger image of Mars on the is the live feed from the camera and appears out of focus which is often how planets look because of the atmospheric seeing effects which distort the views we get at the eye piece and also when using a camera. As discussed previously, stacking software can be used to reduce the impact this shimmering has on the final image, but often if the seeing is bad, it is impossible to correct totally for this. But it was great to share live views of Mars with the audience and also to show them a quickly processed image of the planet. We are grateful to Richard for this.



In the talk, I mentioned that Richard and Gareth had managed to capture the companion star to Sirius (image below). Sirius is the Dog Star (being the principal star of the constellation Canis Major), and the much fainter companion star is called the Pup, more technically Sirius B.



The orbit of Sirius B (the Pup) around Sirius A is shown here (right); it takes about 50 years for Sirius B to make a complete orbit of Sirius A. The two are maximally separated in about 2025, but even now their separation can be detected under good seeing conditions, as proven by Gareth and Richard. Please do have a go and let us know how you get on.

The **December** Plumtree will be hosted by Julian and we are lucky to have Mary McIntyre talk to us online about astronomical sketching.

Thanks to Julian, Richard and Leigh for helping with the November Plumtree meeting.

James Dawson, NAS Helpdesk & Plumtree Meetings <u>helpdesk@nottinghamastro.org.uk</u>

## Footnote:

In the question and answers session, Rhiannon asked Julian why the value of 1.22 was used when calculating the size of the Airy Disc. Julian has since looked this up and has given the following reply:

It seems the factor of 1.22 in the equation is specific to circular apertures, and you would need other constants for different shaped apertures. If you want to calculate these constants, then it involves some rather advanced maths featuring Bessel functions that I can't say I follow (see below). I've also read that 1.22 is an approximation, and if you want more precision you should use 1.2196698912665045!

$$I = I_0 \left(\frac{2J_1(kD\sin(\theta))}{kD\sin(\theta)}\right)^2$$

## Mars in 2020 – a Personal View

I don't have video-imaging capability, so most of my telescopic observation of Mars this year was done at the eyepiece rather than with a camera. I did, however, take this snapshot of the Red Planet on a particularly significant date, October 6<sup>th</sup>, the night when Earth made its closest approach to Mars. At a distance of 62 million kilometres, Mars was shining at magnitude -2.6 and had an apparent diameter of 22.6 arcseconds.



Mars rising among the stars of Pisces at 9:30pm BST on 6<sup>th</sup> October 2020. 5 sec exposure at ISO 1600 with a Canon 450D at f/5.6

As regards visual observation, I used two telescopes: a 300mm aperture Newtonian reflector and an 80mm refractor. I found that the highest useful magnification with either instrument was achieved with a 6.3mm focal length Plossl eyepiece.

The reflector has a focal length of 1590mm, so the magnification was 1590/6.3 = 252 times. The refractor has a focal length of 910mm, so the magnification was 910/6.3 = 144 times.

I tried adding a x2 Barlow lens with the reflector, pushing the magnification up to 504 times, but this was of no benefit whatsoever! Our atmosphere was, as expected, troublesome on every occasion, sometimes particularly so, and an added frustration with eyes of my vintage is the presence of "floaters" that tend to impair the view (young people take note).

What planetary observers are particularly hoping for is good **contrast** in the view, which always seems to be lacking when you first peer into the eyepiece. The trick is to stare at the image for at least ten minutes to let your eye and brain get accustomed to picking out the Martian surface features. I experimented with various coloured filters, and found that the view was enhanced the most by an orange one, although a neutral filter such as I might use on the Moon does help a little.

The dark areas visible on the Martian surface were constantly changing with the planet's rotation, but the south polar ice cap was a fairly constant feature. The "seeing" had to be particularly bad for it not to be visible.

Observing Mars at this opposition was an opportunity not to be missed. We shall have to wait until 2035 for the Red Planet to come as close again.

## **Roy Gretton**

## Jupiter, Saturn and the Star of Bethlehem

On December 21<sup>st</sup> the two giant planets, Jupiter and Saturn, will be in conjunction with each other. At their closest they will be only one-tenth of a degree apart in the late afternoon/evening sky. To see this unusual phenomenon, you will need to be in a location with a clear view of the southwestern horizon. Jupiter will be much the brighter of the two planets, with the fainter Saturn just above it. Through binoculars or a small telescope they will appear in the same field of view, making for a beautiful spectacle. Although such conjunctions occur roughly every 20 years, the last time Jupiter and Saturn came as close to each other was back in 1623. Even more rare is a triple conjunction, when Jupiter and Saturn pass close to each not once but three times within a few months. This last happened as recently as 1981, but it won't happen again until the year 2239. Intriguingly, just such a triple conjunction happened in the year 7 BC, about the time when it is supposed that Christ was born, and this has led to speculation that the story of the Star of Bethlehem might be based on this series of events. It is certainly true that Persian and Babylonian astrologers would have noted these conjunctions with great interest, and may well have considered a triple meeting of Jupiter and Saturn to signify something momentous happening on Earth. So the words recorded in Matthew chapter 2, "we have seen his star in the East" could refer to the conjunction of Jupiter and Saturn that occurred on May 29th of 7 BC, and the later words, "the star...came to rest over the place where the child was" could be based on the later conjunctions of September 30<sup>th</sup> or of December 5<sup>th</sup> in the same year.

The British astronomer **David Hughes** is a champion of this triple conjunction theory. A Nottinghamshire boy (he was born in East Retford and educated at Mundella School), most of his career was spent at Sheffield University where he lectured in geophysics and planetary science. He even has an asteroid named in his honour: 4205 David Hughes. David was a familiar speaker at NAS meetings, and delivered a memorable talk on Comet Hale-Bopp back in the days when we met at the Djanogly City Technology College on Sherwood Rise. He was in no doubt that Hale-Bopp ranked among the truly "Great Comets" of history.

As regards his triple conjunction theory, he presented these ideas in a book, still available today:



**Roy Gretton** 

## First impressions of my eVscope, after ten days...

My Unistellar eVscope (for details, see <u>https://unistellaroptics.com</u> and many third-party reviews that are available, including one by our friend Paul Money) arrived in mid-November after an anxious wait, so I've been spending a few nights chasing breaks in the clouds to set it up, get a feel for how it works and take some photos.

My first impressions are very favourable indeed:

- The instrument, its tripod and the backpack that I bought for storing it in all ooze quality: small features like foam covering on two of the tripod legs to enable you to pick it up without getting cold hands, a rain hood to put over the backpack to keep it dry, spare screws for holding the eVscope on its tripod and a smart felt holder for the supplied toolset show that someone has really thought about what their customers want and expect;
- Setting it up is very easy. Level the tripod using the integrated spirit level, lock the eVscope in place with a couple of screws, turn it on and connect to my iPhone/iPad via the eVscope's built-in Wi-Fi hotspot: job done! The ease and speed of setup makes grabbing observations in marginal cloud conditions a realistic possibility;
- The iOS/Android smartphone/tablet app that drives the eVscope is very intuitive and easy to use: all functions and adjustments (except focussing and collimation), as well as image downloading, are app-driven, so the eVscope itself doesn't need to be touched very much at all during an observing session;
- The GoTo function is extremely accurate: with few exceptions (quickly fixed by carrying out a new star field detection, which the eVscope uses for 'plate solving'), every object that I've looked for has appeared right in the middle of the field of view with minimal adjustment. The eVscope stays precisely locked onto its target for half an hour or more: exposures at least that long are necessary for optimum images of deep sky objects;
- I can drive the eVscope while sitting in our conservatory with a drink in one hand and my iPad or iPhone in the other: no more standing next to a telescope freezing to death for hours on end!
- One real bonus is that I don't need to dark-adapt my eyes, which makes the eVscope very operator- and family-friendly: no more stumbling around in the dark or cursing when someone turns a light on!
- Focussing and collimation adjustments are very simple. However, despite the supplied Bahtinov Mask (easily detachable from the main aperture cover) which helps quite a bit, I still need to fine-tune the focussing for truly sharp images: that will come, I'm sure, after a bit more experience;
- It took a few attempts to take a dark frame successfully: Unistellar are looking into that for me;
- Light pollution, while still somewhat of an issue, does not spoil eVscope observations in the way that it can with other instruments, helped by City/Suburb/Country app settings that presumably drive its sensitivity. The eVscope easily tolerates lights being switched on and off in the hemisphere directly behind the main aperture;
- The tripod is sturdy enough to resist all but the strongest of wind gusts: the fact that the eVscope does not need to be set up at eye level (there is an 'eyepiece', but I don't actually need to use it...) enables the tripod legs to be shortened in breezy conditions to improve stability;

- The eVscope online help files are extensive and customer queries are answered quickly;
- The photos that the eVscope takes (which appear in my iPhone/iPad's Photos app in their own album) need minimal or no post-processing: a simple program that does one-shot photo optimisation is all that's required;
- The battery is charged via a USB port: the eVscope can also be powered from a smartphone powerpack: In theory it can charge your smartphone as well, though I haven't tried that yet;
- I've been using the paid-for Stellarium+ app (£9.99) on my iPhone to navigate around the sky and properly understand the context of the real-time images downloaded from the eVscope that appear on my iPad.

The only downside is that it's not very good for observing bright planets, because the 1.27megapixel CCD sensor is totally swamped when using the Enhanced Vision option: even some bright stars (e.g. Vega) can be challenging. However, I have seen Uranus plus two of its moons, Neptune and Neptune's moon Triton for the first time, which I found very impressive. Unistellar are already discussing adding filters for observing the Sun and possibly the brighter planets, so they are obviously starting to build a complete ecosystem: no doubt software updates will also be brought out that can only improve matters. I tried putting a range of neutral density filters made from plastic film (cost: about £5) in front of the main aperture to see if bright planets can be satisfactorily imaged by cutting down some of their light: this was not successful. Updates happen automatically via the iOS or Android app when the eVscope is connected: data can also be downloaded to the Unistellar servers to enable them to improve the instrument.

I'm really pleased with my purchase and have already had more fun with it in a week than I ever had with the 8" Celestron that I bought in a fit of 'aperture fever' in 2000 (probably before its GoTo capabilities had been fully developed and certainly before accurate GPS was widely available): it's clearly much more suited to my light-polluted garden in Bramcote than the Celestron ever was. Purists will no doubt find the eVscope not to their liking (the same reaction, incidentally, that Galileo received when he revealed his telescope 400 years ago: plus ça change!): however, most casual astronomers will, I'm sure, find that the combination of telescope, camera and computer in one attractive, integrated package meets their needs and will be a joy to use. The price (£2,658 including delivery, plus £179 for the backpack) isn't excessive in my opinion, given its capabilities, quality, ease of use and imaging results. The potential for public outreach is huge, helped by the fact that multiple observers can log into the eVscope Wi-Fi hotspot and control of the instrument can then be passed to and from each person's smartphone or tablet. My neighbours are very impressed indeed with the images that I've captured with my eVscope and I'm looking forward to giving everybody else's telescopes a good run for their money when we can finally have 'star parties' at Cotgrave again!

Some of the eVscope photos that I have taken are shown on the next page: captions are included in the circle that surrounds each image. I know that the bottom two are slightly out of focus, but I wanted to quickly see what objects it could image and the weather wasn't good enough to spend much time 'tinkering' (it takes a while to check the focus in the Enhanced Vision images). I've already volunteered to demonstrate it during an online Plumtree meeting, so please watch out for that.

#### **Mike Provost**

Treasurer, Nottingham Astronomical Society treasurer@nottinghamastro.org.uk



	Nottingham Astronomical Society	Watch recor the NAS we or go to the	dings of our online meetings on bsite www.nottinghamastro.org.uk NAS YouTube Channel.
2 <sup>nd</sup> April	Galaxies: One Gigayear at a time Dr Julian Onions	16 <sup>th</sup> April	Venus J Dawson, G Davies, R Severn, J Onions
7 <sup>th</sup> May	Variable Star Astronomy & Cataclysmic Variables Dr Jeremy Shears	21 <sup>st</sup> May	Backyard Astronomy NAS members
4 <sup>th</sup> June	Wonders of the Southern Sky Professor Ian Morison	18 <sup>th</sup> June	Foundations of Astrophotography Dr James Dawson
2 <sup>nd</sup> July	Mars in 2020 Dr Richard McKim	16 <sup>th</sup> July	A Life Time of Astronomical Observations Alan Heath
6 <sup>th</sup> August	Centenary of The Great Debate	20 <sup>th</sup> August	Deep Sky Astronomy Callum Potter
3 <sup>rd</sup> September	The Plumes of Enceladus Dr Chris Arridge	17 <sup>th</sup> Septembe 27 <sup>th</sup> Septembe	r Live Telescope Stream Jupiter & Saturn r Live Telescope Stream Moon & Mars
1 <sup>st</sup> October	Legacy of the Hubble Space Telescope Dr Steve Barrett	15 <sup>th</sup> October	Astronomy & Physics of the autumn sky
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## **Advertisements**

## FOR SALE

## Pulsar 2.1-metre Observatory Dome and Track in Racing Green

Made by the leading UK manufacturer of GRP observatory domes. The dome and the track are each fabricated in four segments that bolt together. The track is intended to be fixed to a flat roof (and could be used for converting a roll-off roof observatory into a domed one). The complete kit was purchased in 2008.



from Pulsar

The track fitted to a flat-roofed shed



The dome mounted on the track

The original price of the dome and track was **£2000** 

Suggested price £500 but any offer will be considered

Contact Roy Gretton on 07483868162 or journal@nottinghamastro.org.uk

## FOR SALE

## Skywatcher Heritage-114 Virtuoso telescope



Little used and in new condition, with eyepieces.

Current price new £182

Reasonable offers invited

email : grahammarch2@btinternet.com

## Magazines being given away

I subscribe to **Astronomy Now** and normally give my old magazines to the Society's library after I have kept them for a year. Sadly I have not been able to bring the magazines during the pandemic, but members are welcome to come and collect them from me. I will leave the magazines in my front porch at 17 Rannock Gardens, Keyworth NG12 5FQ, which is normally unlocked between 10.00 and 20.00 each day.

#### Sam Boote

## **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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*Observatory line:* 07726 940700 (line open during observing sessions)

## Meetings

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

#### Gotham Memorial Hall Gotham Nottingham NG11 0HE

Doors open	7.00pm
Meetings start	8.00pm
Meetings end	10.00pm

These meetings are open to the public, and visitors are welcome to attend.

## Annual subscriptions 2020

Full£30Joint rate for partnersliving at the same address£45Under-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.

If you would like more information about the **Nottingham Astronomical Society**, or would like to become a member, please contact the Secretary <u>secretary@nottinghamastro.org.uk</u> or speak to any NAS committee member at one of the regular monthly meetings. A membership application form is inside this issue of the Journal.

## The Nottingham Astronomical Society

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