

SPACEWATCH

the newsletter of the Abingdon Astronomical Society

12^h April 2021

**The planetarium in a bedroom,
Eisa Esinga.
About the world's oldest working
planetarium.
Dr Lilian Hobbs
Talk will be on Zoom**

EDITORIAL

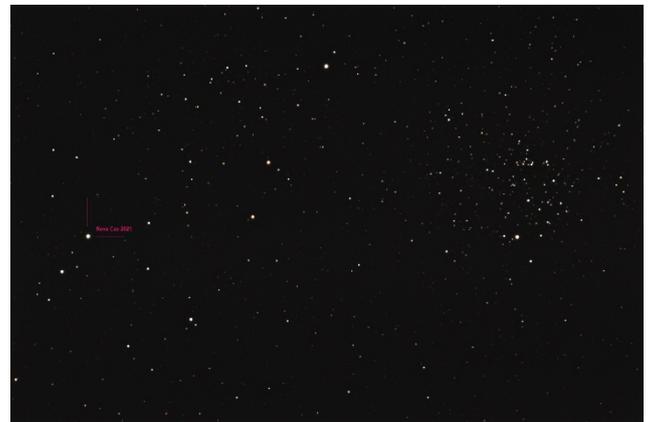
The poor weather seems to have been broken, at least on nights when the moon has been around and this edition of Spacewatch includes a selection of images taken of it. We did have a successful virtual observing evening and my thanks got out to Trevor, Steve and Tony for that, even though Steve's internet connection appears to be run by the local rabbits 😊 This will be the last deep sky one for the year but we will try for a lunar one this month. With the lockdown showing some signs of easing then maybe we can start getting back together again. The next opportunity for this will be the partial eclipse on the morning of Thursday 10th June when we may see something like 20% of the Sun covered. The main eclipse will be annular across Canada, Greenland and parts of Russia. We are still investigating what the position is likely to be with regards to physical meetings next session and will let you know what is going on when we do. What is important however is what members feel about getting back together and as mentioned last time if you have strong opinions one way or the other please let the committee know so we can factor this into our deliberations. It has been a tough ride for everybody and running virtual meetings is not as easy as one would perhaps think. I am surprised however about how many societies have not done this or are doing it very late in the session from the talks I give around the country

As always if there is something you think we should be doing better or you would like to contribute then please contact a member of the committee. As always note that many of the images we publish in Spacewatch first appear on the

Abingdon Astronomy Society group on Facebook and we also have the Abingdon Astronomical Society Page for announcements. I have never been sure of why we have two pages but it is mostly due to the ability to allow anybody to post to one of the groups I believe.

The editor of "SpaceWatch" is Owen Brazell, who would very much appreciate your stories & contributions. In particular whilst many fine images are being posted on the discussion group it would be nice to have some in the SpaceWatch. Please send any news, observations, photos, etc. to:

Mail: Owen Brazell, 15 Spinage Close,
Faringdon, Oxfordshire SN7 7BW or
owenb1367@gmail.com



Nova Cas 20201 (V1405 Cas) Jason Hopkins

NOTICE OF ANNUAL GENERAL MEETING

The Annual General Meeting for 2020/21 will take place on Monday 10th May 2020 by Zoom at 8.00 p.m., and will be followed by a talk by Robin Morris on 'The missing twin (does the Sun have one too?)'. Zoom details to follow.

Agenda

1. Apologies for absence
2. Minutes of the previous Abingdon AS AGM (held 12/10/2020)
3. Matters arising
4. Presentation of Committee's report
5. Presentation of Treasurer's report and Adoption of accounts
6. Membership fees for 2021/2022
7. Election of officers
 - i) Chairman
 - ii) Secretary
 - iii) Treasurer
 - iv) Publicity Officer
8. Election of other committee members (between one and six in number)
9. Any other business

Chris Holt, Secretary, Abingdon Astronomical Society

NOMINATIONS FOR ELECTIONS TO COMMITTEE

Nominations are sought for the posts of Chairman, Secretary, Treasurer, Publicity Officer and between 1 and 6 other committee members.

Under the Constitution of the Society, the "candidates for election shall be proposed and seconded by ordinary members of the Society and the nomination, including the candidate's signature, submitted in writing to the Chairman at least four weeks prior to the Annual General Meeting" (para. 10.3.3). Ordinary members are all those who are not honorary members or affiliated members.

The Constitution goes on to say that, "in the event of there being no candidate for the election of an officer of the Society, or fewer than ten candidates for the election to the Committee, the Chairman may accept nominations given at the meeting" (para. 10.3.4).

Chris Holt, Secretary, Abingdon AS

REPORT OF LAST MEETING

Gwyneth Hueter

March's talk: Martin Hardcastle (University of Hertfordshire) wanted to call this a follow up talk from the talk he gave us in April 2017! 'The environmental impact of radio galaxies'

Prof Hardcastle originally used information from the Spitzer infrared nearby galaxies survey which gave statistics for different kinds of galaxies. Of interest to him are the largest galaxies and clusters of galaxies, as these have the strongest radio emissions. There is so much more information out there now, and the idea of dark matter holding galaxies and galaxy clusters together makes so much more sense.

The galaxy cluster Abell 1689 is a case in point; it has a high density of matter and when viewed in x-rays by the Chandra satellite the centre of the cluster is full of hot gas. A Hubble view shows rather beautiful gravitational lensing. The density of matter is so high in the centre that as galaxies form they appear to be falling towards the centre, where the temperature appears to reach 10 million kelvin. How? Yet the outer reaches cool quite slowly, over tens to 100 millions of years. Why are the central regions staying so warm? You'd expect the central galaxies to get more and more massive as everything gravitates inward, and outer layers of the cluster to get cooler. This is what he calls the 'cooling flow problem'.

(Here come black holes again...)

Evidence indicates that the central galaxy has a massive black hole.

The Milky Way is a larger than average spiral galaxy with a black hole in the centre, of a mass about 3 million times the Sun's mass. The central black hole of some galaxies is much bigger. The one in NGC 4649 (a spherical

galaxy) has a mass of about 2 billion solar masses. Larger ones are available, and if you're wondering about their size, even the largest would be (only?) the size of our solar system. The M87 black hole (the famous doughnut image compiled by the Event Horizon radio telescope collaboration two years ago) is about one billion solar masses.

Radio galaxies can have a radio profile much much bigger than their optical counterpart. The largest so far identified is 15 million light years across. The reason for these huge sizes appears to be that when the central black hole attracts matter onto it, conservation of momentum causes the resulting accretion disc to be highly wound up. That orbiting matter becomes a superheated plasma as it concentrates inward and the magnetic field lines become more and more tangled. These field lines are what pushes out the charged particles in the form of jets coming out of the poles. The jets have fascinated us because they get accelerated to relativistic speeds in order to escape the pull of the black hole. We have known for years that they can even appear to be faster than light if they are coming towards us. We know of a quasar with a jet apparently at 15.4 times the speed of light.

You may have seen the pictures such as Cygnus A with its polar jets and radio envelope lobes. X-ray views also show an envelope of hot blue gas, which continues to stay heated. Centaurus A is also shown to have an envelope of hot gas pushing out from the poles and at a great speed in a bow shock.

When you get a galaxy cluster like the Perseus cluster, you can actually see the hot gas has some little irregularities in it. This appears to be caused by what was spat out by the various galaxies and indicates that their central black holes went through quiescent phases where there was no stuff reaching them. (Much like our Milky Way monster at the moment, although there are large 'Fermi Bubbles' of hot gas above both poles, indicating that it has been active in the last few million years.)

A lot of radio data is now available from the LOFAR northern 2 metre sky survey (called LoTSS = LOFAR Two metre Sky Survey). There was a data release in February 2019, but it is too large for the scientists to wade through. That means an appeal has gone out for citizen scientists to jump in (<https://lofargalaxyzoo.nl>) to look for optical

counterparts to the radio data. It seems the largest mass galaxies have these polar lobes. The survey is hopefully to be completed this year, but the existing data release has produced lots of pretty pictures of tiny spots with huge radio lobes. (That's just for the northern hemisphere, remember.)

23,000 radio galaxies have so far been identified and these tend to be the ones with the highest masses and the most hot gas. How much energy is coming out from their central black holes and how much is there in the jets and lobes? It seems the hot gas is ten times the mass of the stars. Will all this energy slow down the cooling of the universe?

The LOFAR data release number 2 has help coming from the William Herschel Telescope (La Palma) which is measuring the radio sources' redshifts. (WEAVE = WHT Enhanced Area Velocity Explorer, which is a spectrograph analysing LOFAR galaxies with redshifts less than $z=0.4$)

Further data and support is being provided by the SKA (Square Kilometre Array) and the X-ray survey satellite e-ROSITA. But human eyeballs are needed to pore over the data in order to find the tiny smudges that are these huge radio galaxies' visual counterparts.

THE NIGHT SKY FOR APRIL 2021

Steve and Cristina

As we move into British summer time the weather is starting to warm up a little, but the nights don't seem to be getting any clearer, with only a handful of reasonably clear nights through March (fortunately for us, one of them being the Observing evening), I found myself imaging when normally I wouldn't bother, almost constant misty high cloud, which made only objects near the zenith worth attempting. To be honest I'm glad I did as a couple of them turned out better than I had hoped.

We also had the new Nova in Cassiopeia, which Jason Hopkins managed to get a nice image of near to the Open Cluster M52. Hopefully this will still be visible going into April, but if not,

there is plenty more to look at, including a meteor shower later in the month.

The Planets

Mercury – April starts with Mercury in a poor position in the morning sky. Edging closer towards the Sun, Mercury reaches superior conjunction on 19 April, marking its transition from a morning to an evening planet.

Fortunately, things improve greatly for its evening appearance, Mercury rapidly increasing in elevation after sunset towards April's end. On **25 April**, the mag. -1.5 planet sits 1.2° north-northwest of mag. -3.8 Venus. Both planets remain close for the rest of April. On **30 April**, Mercury shines at mag. -1.1 and sets 85 minutes after the Sun.

Its separation from the Sun isn't great in April, but the steep angle the ecliptic plane makes with the western horizon at sunset during spring helps keep Mercury above the horizon after sunset.

Venus - will slowly re-emerge into the evening twilight as an 'Evening Star', just as it did for much of 2019 and 2020.

On **12 April**, Venus sits 3.7° northwest of a less than 1%-lit thin Moon which, at just 7.8° from the Sun, itself may be a tricky spot.

Things improve as we head towards the end of April, Venus's brightness helping the planet stand out so that it can confidently be seen against the evening twilight. Currently Venus shines at mag. -3.8 .

On **25 April** Venus lies 1.1° south of mag. -1.5 Mercury, Venus setting 40 minutes after the Sun on this date (more on this below). By the time the end of the month arrives, Venus sets 50 minutes after the Sun.

We had a spectacular evening apparition of Venus in 2020 when the planet was able to reach a high altitude and it was well separated from the Sun.

This year's appearance won't be so favourable, the timing keeping Venus rather low to the horizon as it separates from the Sun. Despite this, there are still many things to look forward to.

Meetings of Venus and the waxing crescent Moon are an amazing sight to behold, and 2021 presents numerous opportunities to see these.

Mars - Mars is now well past its best for the current apparition, with its brightness dropping from mag. $+1.3$ to mag. $+1.5$ over the month and its apparent size dropping from and 5.3 to 4.7 arcseconds. It's also getting lower as darkness falls. Its rapid apparent eastward motion will keep it visible for a while longer but with such a small apparent disc size it'll be tricky to get any serious detail from the planet via a scope. A 26%-lit waxing crescent Moon sits 3.5° east of Mars on **17 April**. On **26 and 27 April**, Mars lies 0.5° north of the open cluster M35 in Gemini.



Jupiter - Jupiter is a morning planet, rising 70 minutes before the Sun at the month's start, but it's poorly placed so it doesn't achieve much of an altitude.

A 22%-lit waning crescent Moon sits 5.7° south of Jupiter on the morning of **7 April**. At the **month's end**, Jupiter still rises 70 minutes before the Sun, reaching a peak altitude of 14° before sunrise. Next month, Jupiter has an equinox. Although the planet's small axial tilt of

3.1° doesn't cause dramatic seasonal variations in its atmosphere, around an equinox we do get to see some interesting mutual events between the four Galilean satellites.

Saturn - Saturn is a morning object, distancing itself from the Sun. It sits in the constellation of Capricornus, appearing like a mag. +0.7 yellowish star. A 31%-lit waning crescent Moon sits beneath it on the morning of **6 April**, with Jupiter 12° to the east-northeast. At **April's end**, Saturn manages to attain an altitude of around 13° before it's lost in dawn twilight.

Uranus - Uranus is not visible this month, which is a pity as on **23 April** it sits between mag. -3.8 Venus and mag. -1.7 Mercury. Uranus is in conjunction with the Sun on **30 April**.

Neptune - Neptune is not visible this month.

Meteor Showers

The Lyrid Meteor Shower - is a burst of meteor activity occurring around mid to late April.

The Lyrid meteor shower is associated with long-period Comet C/1861 G1 Thatcher. It is the oldest recorded meteor shower still visible today, and was first recorded in 687 BCE.

While the Lyrid meteors will be visible all across the sky. Following their path backwards they will appear to originate from the constellation of Lyra, the lyre, which contains the star Vega.

In reality the meteors have nothing to do with this distant group of stars. The direction they appear to come from is dictated by the motion of the Earth and the debris itself.

These objects are moving extremely fast (about 50km/s) compared to the relatively still atmosphere. In fact, they fall so fast that the air in front of them can't get out of the way fast enough, instead getting rapidly squashed and heating up. This causes the surface of the meteor to reach temperatures as high 1600°C, glowing brightly, which is visible as a short-lived streak of light in the sky.

Most meteors are so small that they burn up well before they hit the ground. However, a handful will get through, with the remnant left on the ground called a meteorite.

All of the meteors are coming in approximately parallel to one another, like lanes of traffic on a straight motorway. Our perspective makes them appear to travel sideways across the sky. Just as a person standing on the central reservation of the motorway will have cars pass on either side of them, the meteors will appear to diverge from the so-called radiant point in Lyra and streak across the sky in all directions.

Very rarely a meteor will be particularly bright, with those appearing brighter than any of the planets (Venus being typically the brightest) classed as a fireball.

Comets

Unfortunately Comet C/202 R4 does not seem to have brightened as much as hoped and is around 10th magnitude as it climbs higher into northern skies. See the chart at the end of Spacewatch for information.

The only other comet was C/2021 D1 (SWAN) which was hoped to break the 10th mag barrier but has remained below it but is currently in the evening sky in Triangulum

Novae

As noted in the mailing list and the FB pages there was a nova in Cas (Nova 2021 Cas or V1405 Cas) This seems to have plateaued around 7th mag so although easily visible in binoculars it won't reach naked eye magnitude unless it has a sudden spurt. Jason Hopkins provided the included image with M52.



Here M53 is class V and NGC 5053 is XI. Although not used by professional astronomers anymore the concentration class is a good guide for visual observers on how easy or hard a cluster maybe to see.

Deep Sky

M67 – An Open Cluster in the constellation of Cancer. M67 is one of the oldest open clusters known

NGC 3344 – A face on spiral galaxy in Leo Minor

NGC 3381 – A barred spiral galaxy in Leo Minor

NGC 3432 – An edge on spiral galaxy in Leo Minor

NGC 3486 – An intermediate barred spiral galaxy in Leo Minor

NGC 3561 – Ambartsumian's Knot, Interacting galaxies in Ursa Major (challenging)

M101 – The Pinwheel galaxy, a face on spiral galaxy in Ursa major

NGC 4147 – A Globular cluster in the constellation of Coma Berenices

M106 – An intermediate spiral galaxy in Canes Venatici

NGC 2146 – A barred spiral galaxy in Camelopardalis

M53 and NGC 5053 – a contrasting pair of globular clusters in Coma. Although less than a degree apart M53 is very easy to see, even in small instruments whilst NGC 5053 is a challenge because of its loose nature. Globular clusters are classified in terms of their concentration class, first proposed by Helen Sawyer and Harlow Shapley in 1927 where Class I is the most concentrated and class XII is the least

OTHER ONLINE TALKS

All meetings for the first half of the session will now be online using Zoom.

The Virtual Astronomy Club:

<https://www.star-gazing.co.uk/WebPage/virtual-astro-club/> who are offering free 7 pm Zoom meetings on a Tuesday and Thursday. PDFs of recent talks are here:

<https://www.dropbox.com/sh/9k7medirj1gkwlt/AAC4dqakRuUiYIJHgz0KKqma?dl=0>

The BAA are also doing virtual webinars which are open to all at

<https://www.britastro.org/meetings>

Look for the webinars page. They are also doing some presentations via Zoom as well which can be seen on their web page. If you miss them then they are available on their YouTube channel afterwards

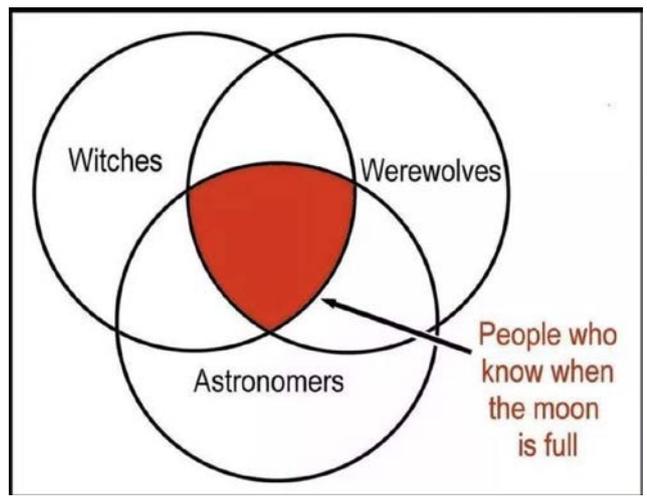
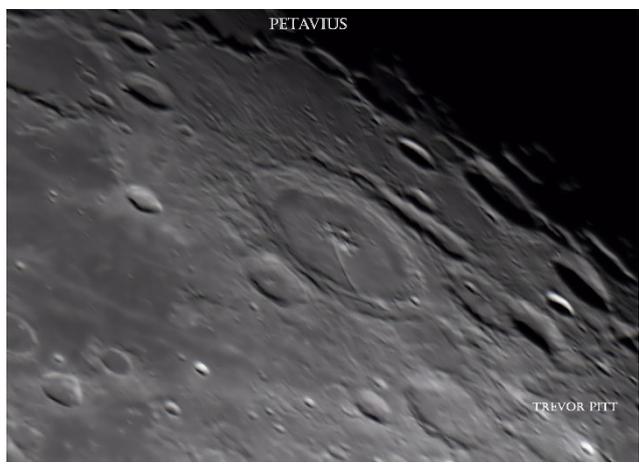
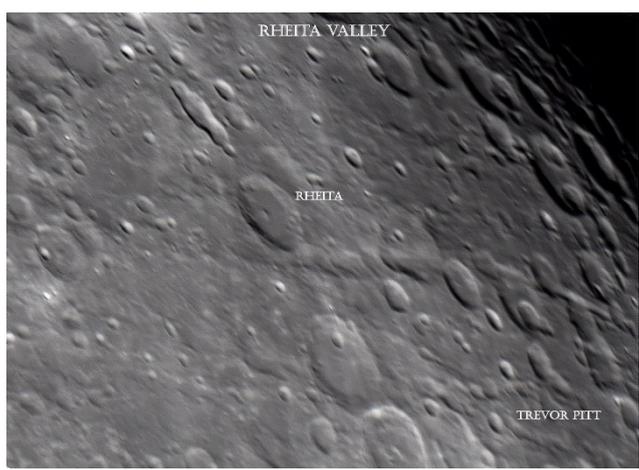
There is also a astronomy radio station that features, amongst others, our January speaker at <https://www.astroradio.co.uk/index.html>

Observing evening: The virtual Observing sessions have worked well so look on the FB page and newsgroup for information on when these are likely to happen. The next projected one will be FCN week commencing 19th Apr. This will concentrate on the Moon

Beginners' meetings: As we no longer have access to our hall due to the Covid situation we are going to be running a series of Zoom beginner's meetings. The next one will take place on April 26th and the topics to be covered include Celestial co-ordinates and Stellar Spectra although subject to change

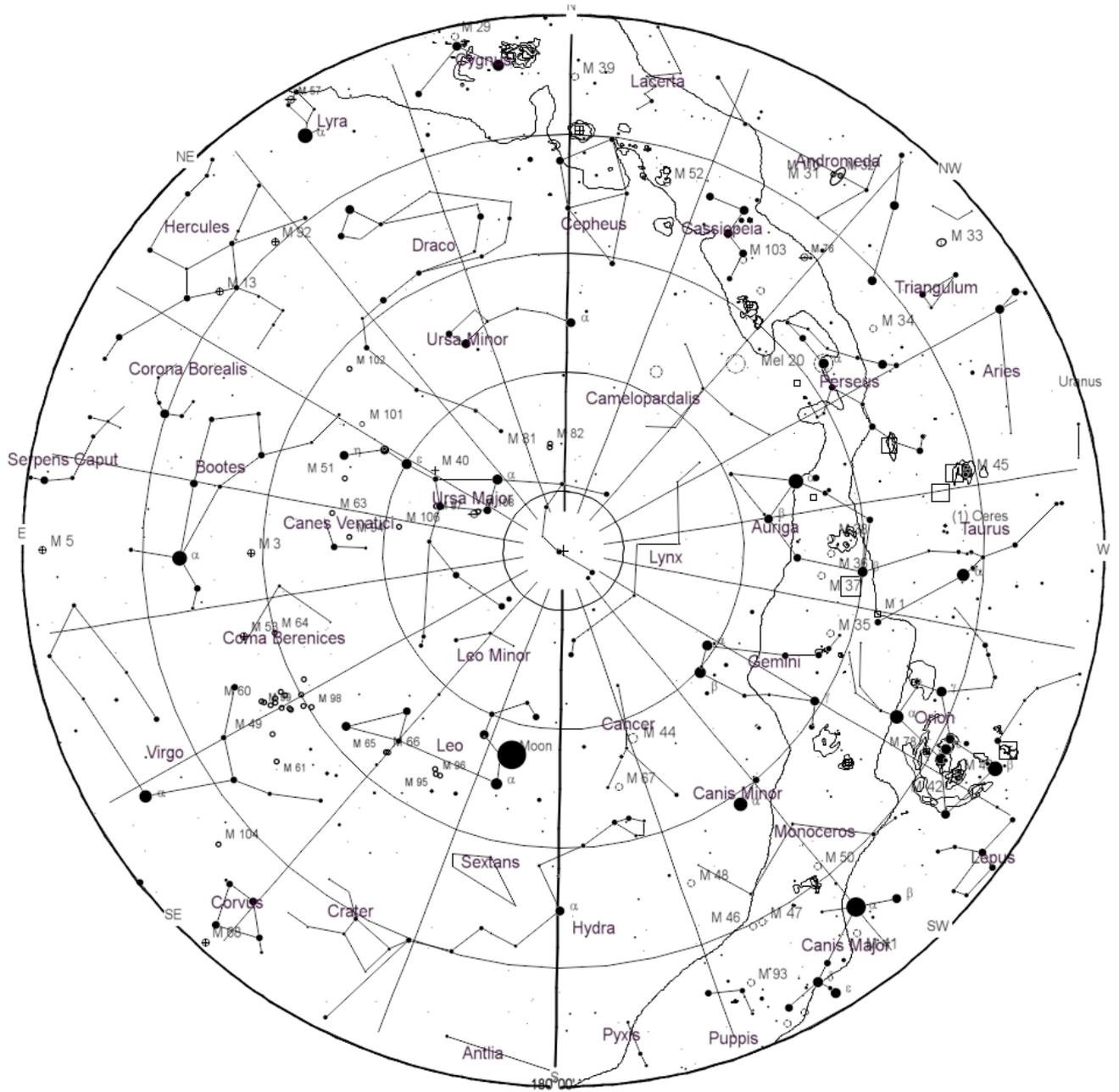
New Mailing List: If you have not already done so, why not subscribe to our new email mailing list. The list is called 'aaslist'. Members use the list to alert each other about celestial events and to chat about amateur astronomy. The list is quite active, with several messages most weeks. This will also in the current circumstances be the main form of information going forward To subscribe to aaslist and to read through previous messages click on:

<http://lists.abingdonastro.org.uk/mail.cgi/list/aaslist>



STAR CHART

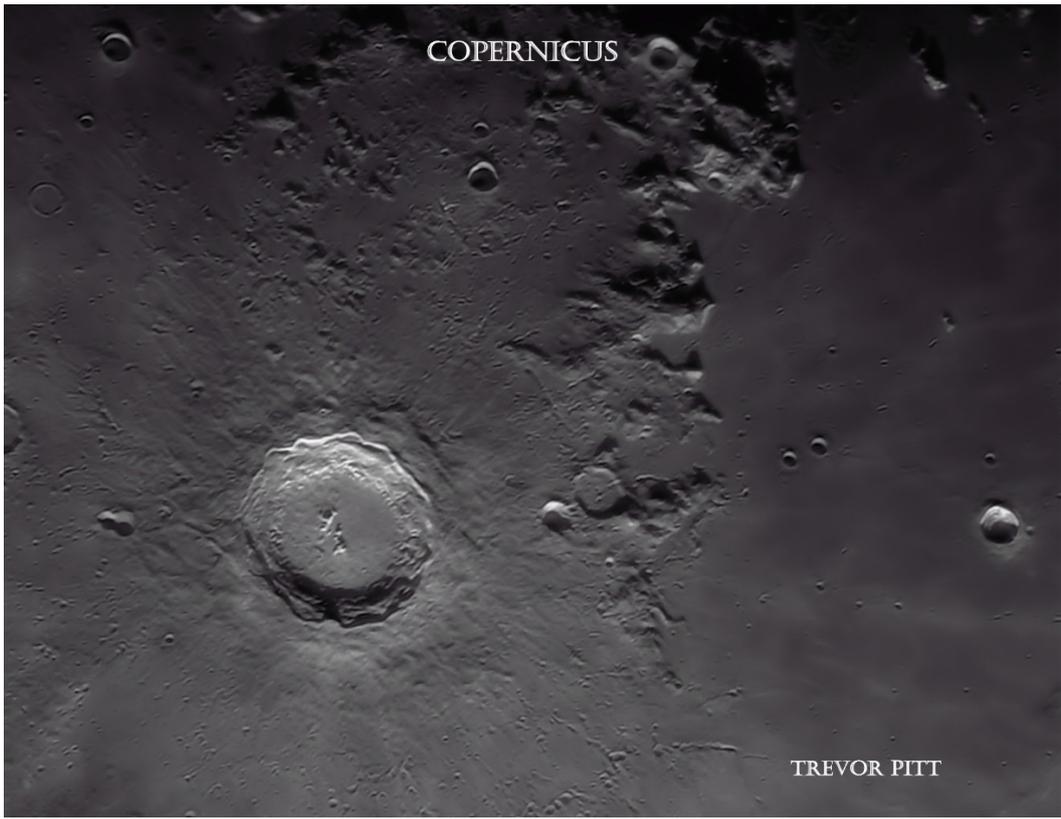
The night sky at 22:00 (DST) Thursday 15th April 2021

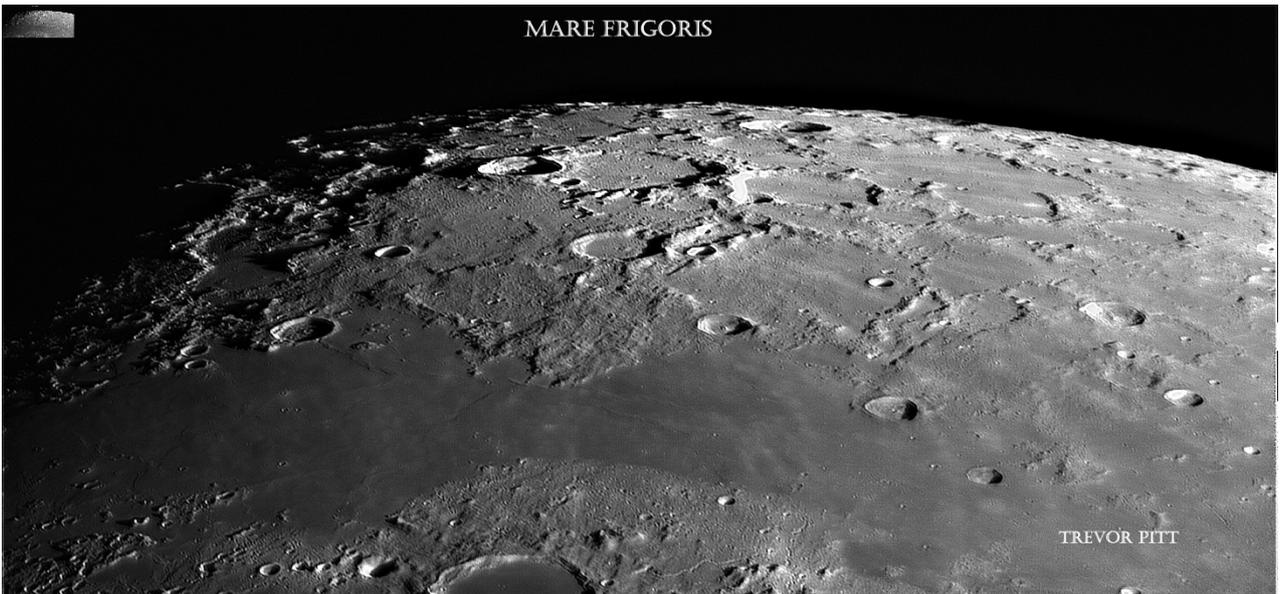
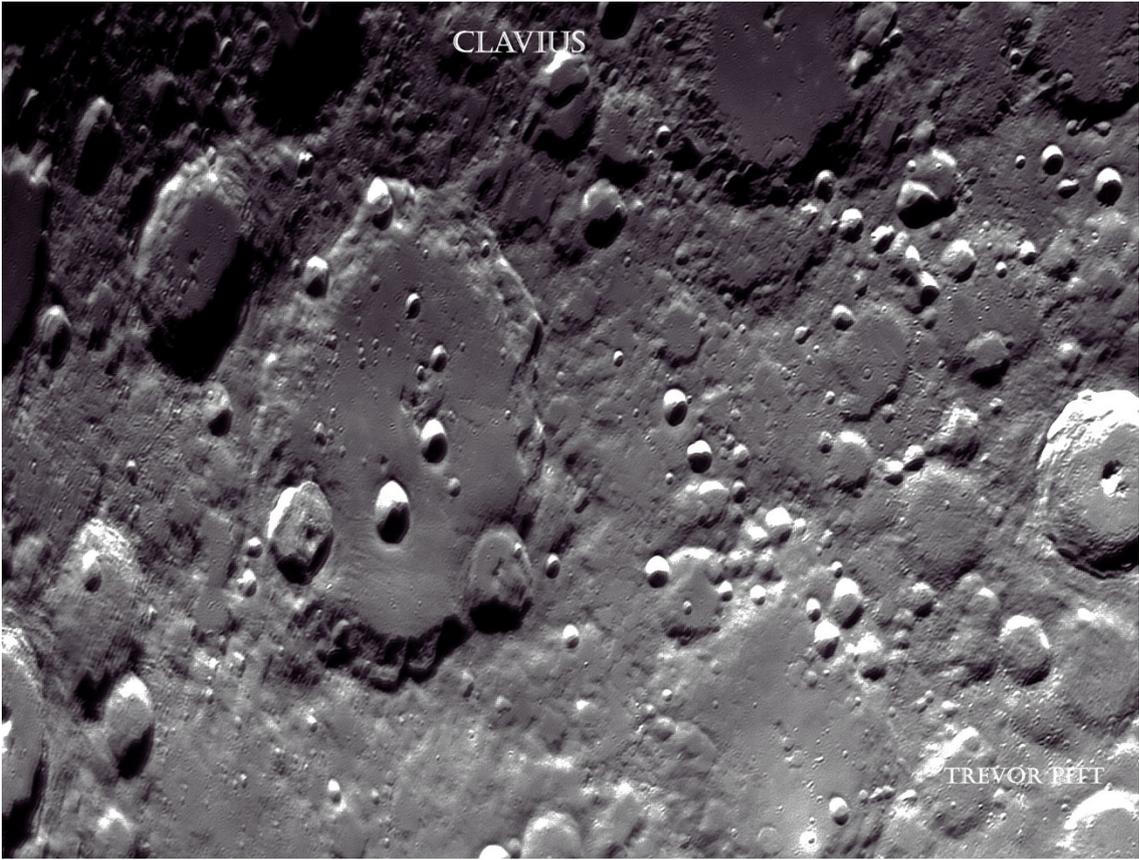


MOON PHASES APRIL 2021

Moon phases and solar and lunar rise and set times for April 2021

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 ☾ ↑00:05 ↓07:36 ☀ ↑05:47 ↓18:33 ☁ 03:42 20:40	2 ☽ ↑00:05 ↓08:09 ☀ ↑05:45 ↓18:35 ☁ 03:39 20:42	3 ☽ ↑01:25 ↓08:54 ☀ ↑05:43 ↓18:37 ☁ 03:36 20:44
4 ☾ ↑02:31 ↓09:51 ☀ ↑05:41 ↓18:38 ☁ 03:33 20:47	5 ☾ ↑03:23 ↓10:59 ☀ ↑05:38 ↓18:40 ☁ 03:30 20:49	6 ☾ ↑04:01 ↓12:12 ☀ ↑05:36 ↓18:42 ☁ 03:28 20:51	7 ☾ ↑04:28 ↓13:29 ☀ ↑05:34 ↓18:43 ☁ 03:25 20:54	8 ☾ ↑04:50 ↓14:43 ☀ ↑05:32 ↓18:45 ☁ 03:22 20:56	9 ☾ ↑05:07 ↓15:55 ☀ ↑05:29 ↓18:47 ☁ 03:19 20:59	10 ☾ ↑05:22 ↓17:06 ☀ ↑05:27 ↓18:49 ☁ 03:16 21:01
11 ☾ ↑05:36 ↓18:15 ☀ ↑05:25 ↓18:50 ☁ 03:13 21:04	12 ☾ ↑05:49 ↓19:24 ☀ ↑05:23 ↓18:52 ☁ 03:09 21:06	13 ☾ ↑06:04 ↓20:33 ☀ ↑05:21 ↓18:54 ☁ 03:06 21:09	14 ☾ ↑06:20 ↓21:43 ☀ ↑05:18 ↓18:55 ☁ 03:03 21:12	15 ☾ ↑06:40 ↓22:51 ☀ ↑05:16 ↓18:57 ☁ 03:00 21:14	16 ☾ ↑07:03 ↓23:58 ☀ ↑05:14 ↓18:59 ☁ 02:57 21:17	17 ☾ ↑07:38 ↓--: ☀ ↑05:12 ↓19:00 ☁ 02:54 21:20
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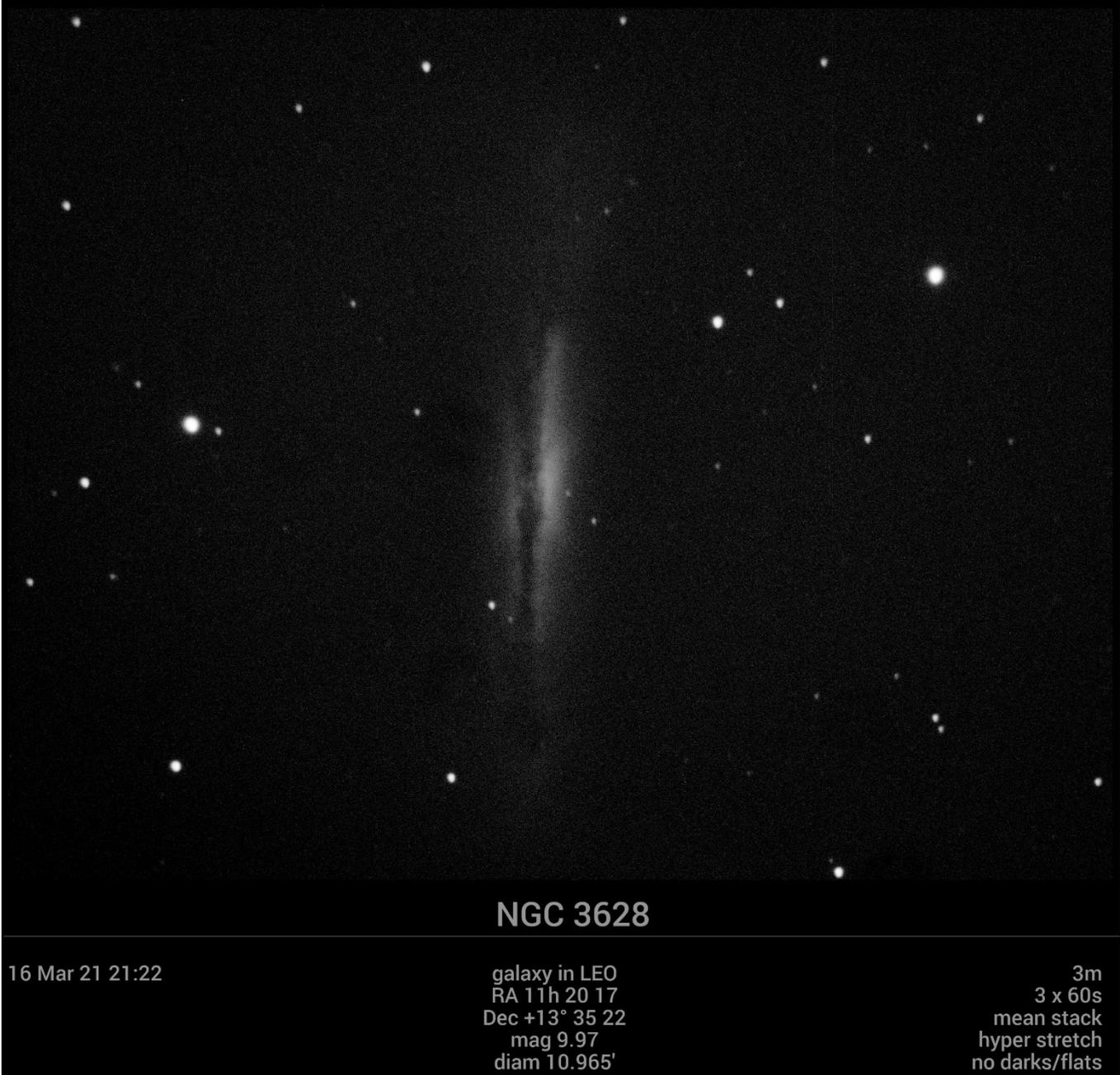






Moon – Steve Creasey

Images taken by Tonny Booer at the last Virtual observing session of several of the targets of that evening using C9.25 and Atik camera in LiveView mode





Messier 108

16 Mar 21 20:41

galaxy in UMA
RA 11h 11 31
Dec +55° 40 27
mag 10.7
diam 3.981'

8m
8 x 60s
mean stack
hyper stretch
no darks/flats

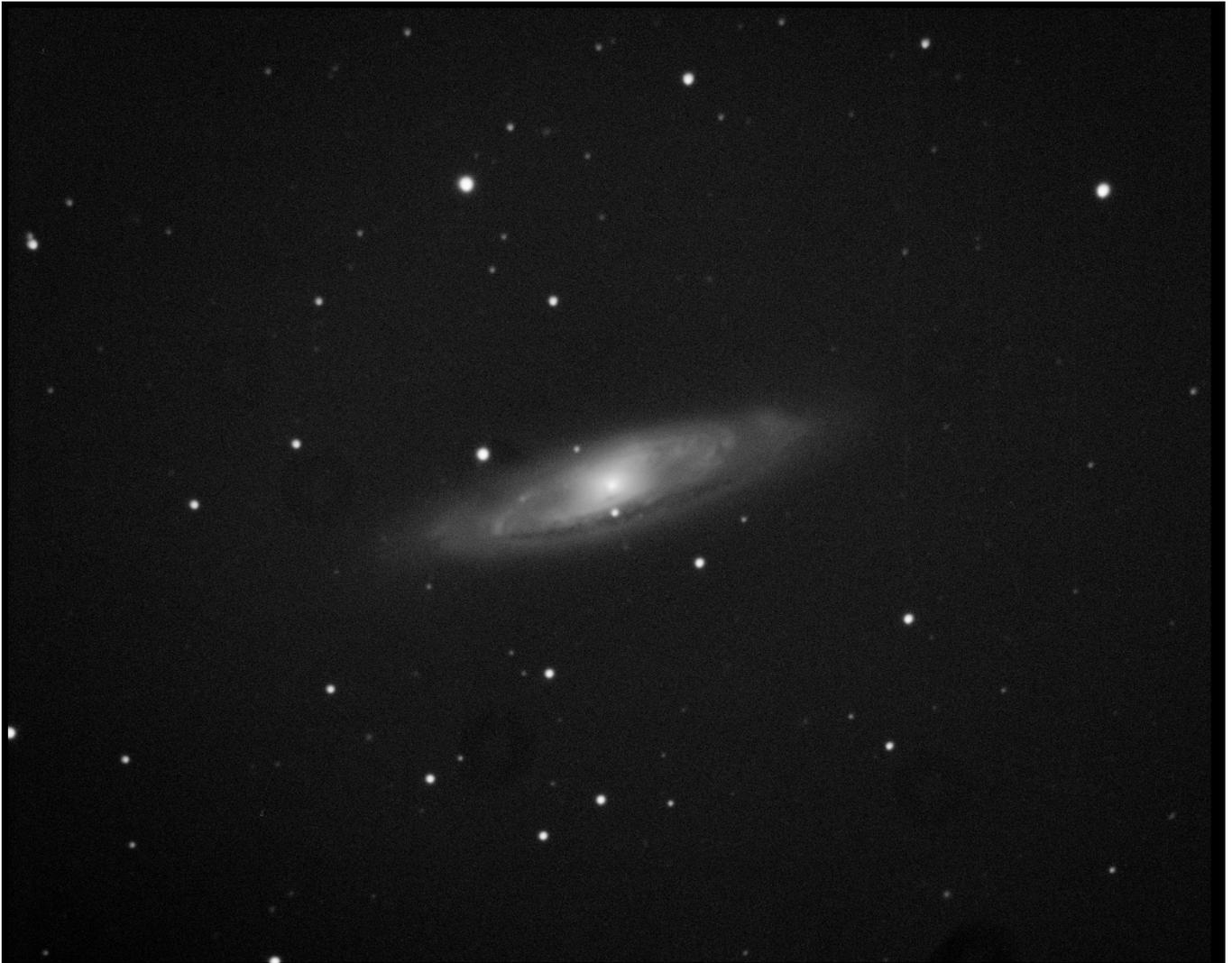


Messier 82

16 Mar 21 20:14

galaxy in UMA
RA 09h 55 52
Dec +69° 40 47
mag 8.94
diam 10.965'

8m
8 x 60s
mean stack
hyper stretch
no darks/flats



Messier 65

16 Mar 21 21:01

galaxy in LEO
RA 11h 18 56
Dec +13° 05 35
mag 10.14
diam 7.586'

10m
10 x 60s
mean stack
hyper stretch
no darks/flats



Messier 81

16 Mar 21 19:54

galaxy in UMA
RA 09h 55 33
Dec +69° 03 55
mag 7.79
diam 21.38'

9m
9 x 60s
mean stack
hyper stretch
no darks/flats



© Steve Creasey Photography

Leo Triplet – Steve Creasey 6" RC



M 81 – Bodes Nebula – Steve Creasey



Abell 16 Planetary Nebula in Lynx - Ian Smith



M42 – Steve Creasey

Beginners Meeting Program 2020/2021

2020/21 Long Talk

Short Talk

APR Celestial Co-ordinates

Star Spectra

MAY Dwarf Planets, Asteroids, & Comets

Sun in White Light

JUN Imaging Planets

Astronomy 150-1543 AD: A 1400 year wait,
and then Copernicus'



Markarians Chain – Stece Creasey

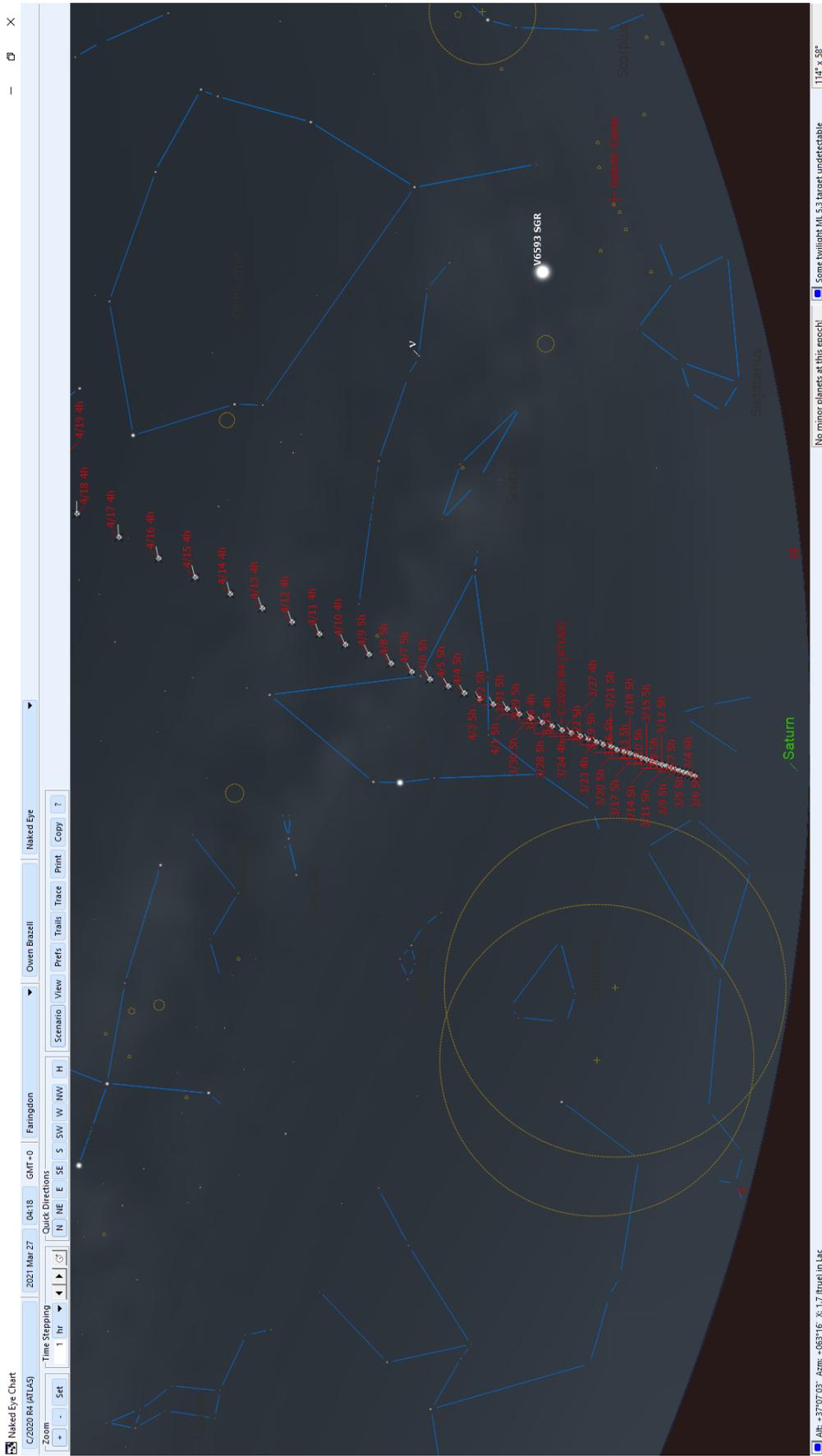
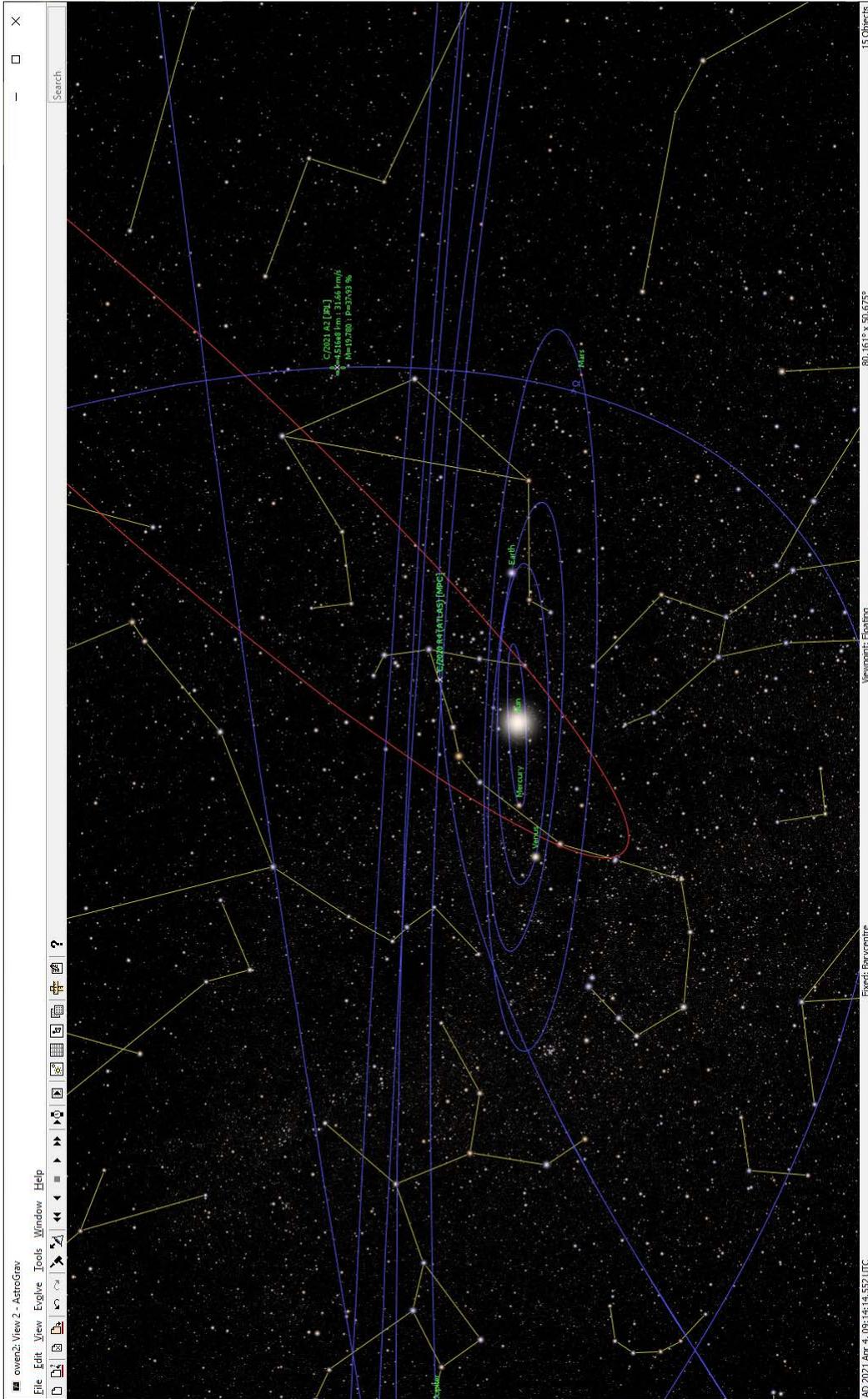


Chart for C/2020 R4(Atlas) for March and April
From SkyTools 4



Orbital diagram for C/2020 R4 (ATLAS) at the end of March from AstroGrav