

# SPACEWATCH

**the newsletter of the Abingdon Astronomical Society**

**9<sup>th</sup> November  
Bad Science  
James Fradgley  
Bournemouth NSS  
Talk will be on Zoom**

## **EDITORIAL**

I am sorry I had to miss the AGM but I was at the Kelling Heath star party which took place despite the current Covid situation. Unfortunately we had a run of perhaps the worst observing weather in 15 years and this does not bode well for its being moved into October, unfortunately not the star parties choice as the Forties weekend in September in Holt/Sheringham now attracts over 40000 people and the camp sites will prioritise that over the star party. About the only decent views we got were of Mars but as you can imagine through a 22" telescope were rather spectacular Mars showing one of its more bland faces. Despite the fact that it is past opposition Mars is still well placed and showing a large image. The imagers amongst us seem to be having a field day with it. I hope that you will not ignore it I see NASA managed to get bits of Bennu and then managed not to shut the sample capsule door so they are now leaking out ☹.

Our first virtual observing evening went well despite the challenges of the weather and I have to thank Trevor Pitt, Steve Creasey and Tony Booer for making this a success. Hopefully we will get another shot at this. My thanks as well to the imagers who have provided the images for this issue.

I hope as well you are enjoying the Zoom meetings. As mentioned in the last newsletter unfortunately I do not see the situation improving for the 2020/21 session in terms of physical meetings and I can only hope that perhaps for 2021/22 we may get back to them. I did talk with the IAS organisers for next October and I think they feel that it is probably only 50/50 even for then. It is interesting to note however that almost all astronomical equipment suppliers are having a great time during the lockdown and many items are now on long backorder.



Mars – John Napper

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](mailto:owenb1367@gmail.com)

## **NATIONAL ASTRONOMY WEEK**

Although most physical events have been cancelled, including our own National Astronomy Week still intends to go ahead with online presentations. The website for this is <https://astronomyweek.org.uk/>. The dates are the 14<sup>th</sup> Nov-22<sup>nd</sup> Nov. The focus is around Mars

## REPORT OF LAST MEETING

Gwyneth Hueter

September's talk: 'Lady Pioneers of the BAA', given by Mike Frost (Director of the historical section of the BAA), was a first for Abas, as it was our first online talk.

Mike has collected information on a remarkable catalogue of women who were involved in the earliest years of the British Astronomical Association (and its forerunners, the Liverpool and Leeds Astronomical Societies), and managed to reel off a lot of information in just an hour.

Mary Acworth Evershed (maiden name M.A. Orr, 1867-1949) was the first director of the BAA Historical Section and she produced the first popular guide to the southern stars. Her husband John ran an observatory in southern India (Kodaikanal). Mary became a keen solar observer and they later moved to Australia. She also wrote a who's who on those people who had had lunar craters named after them. Her astronomical knowledge also enabled her to identify many astronomical allusions in Dante's inferno, long overlooked or just forgotten. Tracy Dougherty has written a biography about her.

Elizabeth Brown (1830-1899) was a solar specialist who had her own private observatory in Gloucestershire. She was a member of the Liverpool AS even though she did not live there. She was a keen umaphile; she chased total solar eclipses in Russia, Trinidad and Norway, and wrote travelogues thereof.

Lady Huggins (née Margaret Lindsay Murray, 1848-1915) was into photography and spectrography and met her future husband William in the 1870s. Their shared interest in spectrography brought them together, as they discovered that some stars shared the same spectrum as our Sun, and that some nebulae were emission nebulae like M42. Prior to her adding her photographic skills to the mix, he had been hand-drawing the spectra. They co-authored an atlas of spectrography.

Agnes Clerke (1842-1907) was an inaugural council member of the BAA. She hailed from Cork and wrote 'A Popular History of Astronomy during the 19th Century'. She spent several months in South Africa also.

Annie Scott Dill Maunder (née Annie Russell, 1868-1947) reminds us of how limited the prospects were for women in that time. She was able to study maths at Cambridge but was not allowed to graduate. She worked as a 'computer' at the Royal Greenwich Observatory but lost her job when she married her boss Walter, who was widowed with five children. Married women were not allowed jobs. She loved astronomy and joined the BAA as soon as she could and continued to work as her husband's assistant. She specialised in solar observing. She plotted sunspots through two solar cycles and was the first to identify the pattern we call the butterfly diagram, where sunspots early in the solar cycle form nearer the poles, but they form nearer and nearer to the equator as the cycle progresses.. She too, produced a popular book: 'The Heavens and their Story'.

Alice Everett (1865-1949) was another to become a 'computer' at Greenwich after studying maths at Cambridge, but also failed to further her career through being a woman. She worked at the 'Carte du Ciel' star atlas project in Potsdam (Germany) then tried to get observatory jobs in the USA. She came back to the UK, left astronomy, although she remained a kingpin of the BAA, and she became very involved in optics, electrical engineering and the fledgling days of TV design. She worked for the Baird company. She had familial links with Scotland and Ireland.

Mary Adela Blagg (1858-1944) came from Cheadle (Staffordshire) and there is a statue of her there. She came from a large, wealthy family and was educated at home. In those days scientists would often supplement their wages by touring the country and giving talks, and this was how Mary became interested in astronomy. She got hooked on variable stars, and mapped their luminosities, cleverly extrapolating the bits of a cycle that got

missed. She also standardised the lists of named lunar craters, fixing those names that could no longer be attached to craters because of old ambiguous recordings. She provided this information for the IAU, and did nearly all of this by correspondence.

Fiammetta Wilson (1864-1920) seems to have been a real character. Born Helen Worthington in Lowestoft, married, moved to Canada, came back to the UK and was co-director of the BAA meteor section. She got into trouble when trying to observe during the blackouts of WW I. Mike described her as a bit of a fanatical observer and may have suffered burnout.

Grace Cook (1877-1958) was another co-director of the BAA meteor section. She came from a wealthy family, had her own observatory, and when her family business began to fail she continued her astronomy and was the first Briton to observe Nova Aquilae in November 1918.

Catherine Octavia Stevens (1864-1959) was another who became director of the BAA meteor section. She observed the three total solar eclipses of 1900, 1905 and 1932. She was particularly interested in observing the shadow bands which can usually be seen briefly in the very final stages just before and after totality.

Gertrude Bacon (1874-1949) was a founder member of the BAA and apparently another character. She was able to see the eclipse of 1896 (Norway) then used a hot air balloon to try to observe the Leonids in 1899 above the clouds. Unable to see the land below, and after pulling the wrong string, she and her fellows nearly ended up in the Bristol Channel but luckily came down in Neath in the morning. They had not flown in the dark before.

Mike wound down his talk by mentioning other women briefly, some of whom may be worth looking up: Dorothea Klumpke Roberts, born in San Francisco also observed the 1899 Leonids from a balloon. By that time she had moved to Paris to be head of the observatory and had joined the BAA. Agnes Giberne (1845-1939), a BAA founder member who wrote children's books on astronomy.

Irene Elizabeth Toye Warner, who wrote about ancient history and the worship of the planet Venus, before becoming involved in spiritualism.

The RAS charter of 1820 did not recognise women directly but gave them honorary fellowships. Notable among them were Caroline Herschel, Mary Somerville, Agnes Clerke, Margaret Huggins and Annie Jump Cannon. When the RAS charter was amended in 1915 so that women could be members in their own right, five women joined, and they were already BAA members. Among them was Annie Maunder.

I'm glad our first online speaker was a polished Zoom talker. A good subject and a good start to our season. I have left some of the women's names out, but am happy to pass them on to anyone interested.

October's talk: AGM presentation by member Andrew Steel. 'Edwin Hubble'

There won't be anyone among us who hasn't heard of Hubble, especially as we have been celebrating thirty years of the eponymous Hubble Space Telescope this year.

It was also a great pleasure to hear how much Edwin loved the UK

He was born on 20/11/1889, and his brains were already showing when he started as a freshman in Chicago at age 16. He was a Science Fiction fan and studied Maths and Astronomy. I'm glad he also did some running, high jump, long jump and shot put. He was also keen on basketball (he was 6ft 2" tall). His father discouraged him from indulging his passions and made him train as a lawyer. He did become very keen on improving USA and UK links and spent three years in Oxford Queen's College from 1910-13 on a Rhodes Scholarship. He also visited Europe and came back to visit the UK after marrying. He really loved Britain and his habit of pipe-smoking stemmed from that.

Struggling to find a job in astronomy he did become a supervisor at Yerkes Observatory near Chicago from 1914-16. There is a photograph of him in front of the great 40" refractor there, posing with a group of dignitaries, including

Albert Einstein. This was in 1921. He is quite distinctive because he is the tallest one in the picture.

While at Yerkes he completed his doctorate on photographic investigations of faint nebulae. He took over 1,000 exposures on wet plates - two hours each. He had also tried to help in the war effort in 1916. He arrived in Glasgow then went to France via Southampton. The journey took so long that the war was over, but at least he missed the flu epidemic.

In 1919 he was recruited by George Ellery Hale as director of Mount Wilson's 100" Hooker telescope. This lovely beast enabled him and his colleagues to identify Cepheid variables in M31, thereby confirming that M31 was not in our galaxy. In 1923 he was able to say he had discovered galaxies, and that the universe was expanding. In 1924 he married the daughter of a rich banker from southern California, Grace Burke Lieb. She was very proud of his achievements. They toured Britain and Europe and she wrote his biography.

On 3/6/1948 the Mount Palomar 200" Hale telescope was inaugurated. Hubble was able to look through it and observed NGC 2261, which is now called Hubble's Variable Nebula. He continued his observations, sitting in the cage behind the secondary. His observations of galaxies enabled him to come up with his famous 'tuning fork' diagram of galaxy classifications. (That's the diagram with the elliptical galaxies in the handle 'morphing' into the spirals and barred spirals along the two tines respectively.) He was able to classify all galaxies apart from about 5%, which were the irregular ones, and saw that the ellipticals were the largest.

Although Hubble could see that the universe was expanding, he did not go along with the Big Bang theory. His calculations using redshift and distance came up with the Hubble Constant, around 70 km/s per mega parsec.

He was awarded a lot of medals, including one by the RAS in 1940, when he was still at Mount Wilson.

He has a crater on the Moon named after him, 81km diameter, so quite decent.

Asteroid 2069 is named after him.

He died of a cerebral haemorrhage on 28/9/1953, so only 63. He had already survived a heart attack.

The Hubble Space Telescope was launched in 24/4/1990.

## THE NIGHT SKY FOR NOVEMBER 2020

### Steve and Cristina

#### What's Up – November 2020

October saw our first online observing session, on the whole the evening was a success, with clear skies for Trevor down south, a few holes in the cloud for Tony near Eynsham and almost solid cloud for me near Faringdon.

As a first venture into online observing sessions it went well, the technology seemed to work well for the most part, with only a few minor teething issues, including overlooking posting notifications on Facebook and the AAS website, for this we can only apologise to anyone that missed it due to this reason. This won't happen again.

In October the Spiral galaxy NGC 514, in the constellation of Pisces, treated us to a Supernova! Some 83 million light years from Earth, it easily outshone the other hundreds of billions of stars within the same galaxy! It is always amazing to think that we are seeing something that happened 83 million years ago, and that the Supernova explosion itself, for a short time at least is brighter than the entire Galaxy of stars.

### The Planets

#### Mercury

At its greatest western elongation ( $19^\circ$ ) on the 10th, when it shines at magnitude -0.7. It is visible for most of the month and is the best apparition of this elusive planet in 2020. It lies on the Virgo/Libra border. At 06h on the 13th there is a good opportunity (weather permitting), to see the wafer thin crescent Moon, with earthshine on its night hemisphere, lying

between Venus and Mercury in the increasing twilight of the ESE horizon. The Moon lies  $8^{\circ}$  to the upper right of Mercury and  $4^{\circ}$  to the left of Venus. Venus at magnitude at -4.0 is in the constellation of Virgo and on the 13th of November lies  $5^{\circ}$  above the first magnitude star Spica (alpha Virginis), and may be seen rising in the ESE sky around 05h. On the 12th it may be seen at that time  $8^{\circ}$  above the horizon. Some  $10^{\circ}$  to the upper right of the planet is the thin crescent Moon with earthshine, affording a good opportunity to image Venus and the Moon. The next day at the same time, the two are  $5^{\circ}$  above the horizon and now being separated by just  $4^{\circ}$ . This will be a beautiful sight in binoculars if the sky in the region of the ESE horizon is clear of cloud or haze. On both occasions, the presence of earthshine on the Moon enhances the spectacle.

## Venus

Venus at magnitude at -4.0 is in the constellation of Virgo and on the 13th of November lies  $5^{\circ}$  above the first magnitude star Spica. It can be seen rising in the ESE sky around 05h. On the 12th it may be seen at that time  $8^{\circ}$  above the horizon. Some  $10^{\circ}$  to the upper right of the planet is the thin crescent Moon with earthshine, giving us a very auspicious opportunity to image the planet and the Moon. The next day at the same time, the two are  $5^{\circ}$  above the horizon and now being separated by just  $4^{\circ}$ . If you have binoculars you might want to use them. Check for a clear ESE horizon. On both occasions, the presence of earthshine on the Moon enhances the spectacle.

## Mars

It is visible for most of the night, but at the end of the month sets at 03h in the western sky. As the month progresses, the planet fades from -2.0 to -1.0, a full magnitude. Nevertheless, it is a conspicuous object in the constellation of Pisces to the lower left of the Autumn ‘Great Square of Pegasus’. The major features including the south polar ice cap are still visible through small telescopes, even though the angular diameter shrinks from 19 secs to 15 secs of arc as the distance increases once again during November. The waxing gibbous Moon may be seen

$5^{\circ}$  to the south of Mars, and the pair culminate on the south meridian at 21h on the 25th of the month.



Mars - Chris Pickford



Mars - Steve Creasey

## Jupiter

This giant is visible low in the SW sky for several hours after sunset during November. It is, as always, a conspicuous object shining at magnitude -2.1. On the evening of the 12th Jupiter is in conjunction with Pluto, Jupiter lying  $0.7^{\circ}$  to the north of Pluto at the time. In the vicinity is Saturn, which lies some  $3^{\circ}$  to the left of Jupiter. All three planets are in Sagittarius near to this constellation’s boundary with Capricornus. On the evening of the 19th the broad crescent Moon passes approximately  $3^{\circ}$  to the south of the planets. Do look for the Jovian satellites in their nightly dance around the giant planet.

## Saturn

During November, Saturn ‘s visual magnitude is +0.6 and lies, as mentioned above, in western Sagittarius, several degrees east of the much brighter Jupiter and nearer to the

Capricornus/Sagittarius border. Jupiter is approaching Saturn to a very close conjunction between the pair on December 21st

Uranus, in the constellation of Aries, is visible for most of the night, opposition having occurred on October 31st. The planet's visible magnitude is +5.7, just about on the threshold of naked eye visibility, and presents a disc 3.8 secs of arc in diameter. Although the planet's magnitude is +5.7, and is theoretically visible to the unaided eye, it is far better to locate it using binoculars or a small telescope. Through a telescope the planet presents a tiny greenish-blue disc.

## Uranus

Uranus in the constellation of Aries comes into opposition (opposite the Sun in the sky), on the 31st, and is theoretically visible all night. The sixth magnitude planet lies 10° below the constellation's brightest star, the +second magnitude star Hamal (alpha Arietis), a yellow giant star 85 light years away

## Neptune

This remote blue ball lies to the lower left of the circle-ish of stars marking the position of Pisces yet remains in the constellation of Aquarius. It has a visual magnitude of +7.8 and so requires binoculars or a telescope. With adequate magnification, it is possible to see this distant world as a tiny bluish grey disc. The angular diameter of the planet is just 2.4 secs of arc. By the end of November, Neptune sets at astronomical midnight.

## Meteor Showers

**The Leonids** are usually one of the more prolific annual meteor showers, with fast, bright meteors associated with Comet Tempel-Tuttle. The radiant (the point where the meteors seem to stream from) is at the head or 'sickle' of the constellation Leo, hence the name.

The Leonids shower will be between the 10<sup>th</sup> and the 20<sup>th</sup> of November, with the peak being on the night of the 17<sup>th</sup> – 18<sup>th</sup>

At the peak the ZHR (Zenithal Hourly Rate) is forecast to be 10 – 20 per hour, but this is only a guide and occasionally this figure can be way more.

As the comet follows its path around the sun, it leaves a path of tiny debris. The cometary debris enters our planet's atmosphere at speeds of up to 70 kilometres per second, vaporising and causing the streaks of light we call meteors. Hunting for meteors, like the rest of astronomy, is a waiting game, so it's best to bring a comfy chair to sit on and to wrap up warm as you could be outside for a while. They can be seen with the naked eye so there's no need for binoculars or a telescope, though you will need to allow your eyes to adjust to the dark. However, if you miss the peak, the shower continues at a reduced rate for several days either side, so there should be plenty of chances to see the display .

Where is best to watch the Leonid meteor shower?

For the best conditions, you want to find a safe location away from street lights and other sources of light pollution. The meteors can be seen in all parts of the sky, so it's good to be in a wide open space where you can scan the night sky with your eyes. But if you trace the paths that the meteors take, they seem to originate from the constellation of Leo.

If you manage to get any pictures of the Leonid meteor shower then we'd love to see them.

## Meteor storms

About every 33 years (the period of Comet Tempel-Tuttle), the Leonids produce meteor 'storms' when hundreds or even thousands of shooting stars can be seen. Such storms were seen in 1799, 1833, 1866, 1966 and 1999-2001 (although the expected 1899 and 1933 storms were disappointing). The 1833 storm was particularly spectacular, with an estimated 100,000 meteors per hour. The 1999-2001 storms produced about 3000 per hour.

**The Taurids** - Now is the time to watch out for a fireball or two from the long-lasting South or North Taurid meteor showers. Various sources give wildly different dates for the peak of South Taurids (active from late September to late November), and the night of November 4-5,

2020, is one of those predicted times. The night before, or after, might be good to watch for meteors, too. Unfortunately, the light of the bright waning gibbous will accompany the peak of the South Taurids, which rarely produces more than 5 meteors per hour, even at maximum.

About a week later, when the North Taurids peak on the night of November 11-12, the moonlight from the waning crescent moon will be much less intense. Despite the sparse number of meteors from these overlapping showers, the percentage of fireballs is rather high, so a few Taurids may well overcome the moonlit glare in the first week of November 2020. Skywatchers are still remembering the Taurid fireballs they saw in 2015. The Taurids appear to have a 7-year cycle of bright fireballs, and 2015 was apparently a peak year!

## Comets

### COMET NEOWISE C/2020 P1 (Perihelion 2020 October 20)

Following on the heels of the borderline- "Great" Comet NEOWISE C/2020 F3, the NEOWISE mission discovered another small-perihelion distance comet (0.34 AU) on August 2. The comet is presently around 16th magnitude and is deep in southern circumpolar skies (current declination -73 degrees), and remains exclusively accessible from the southern hemisphere up until almost the time of perihelion passage.

UPDATE (October 17, 2020): As it continued to approach perihelion Comet NEOWISE remained relatively faint throughout September, but according to reports from observers in the southern hemisphere it started to brighten fairly rapidly towards the end of the month, and was apparently close to 9th magnitude when it disappeared into sunlight in early October. Recent images from the STEREO-A spacecraft indicate that it is still surviving as of this writing, although they also suggest that it has not brightened much further. In any event, the comet is currently 11 degrees due west of the sun and, if it continues to survive, it becomes accessible low in the northern hemisphere's morning sky towards the end of October. How bright it might be at that time remains to be seen; conceivably, it could be

anywhere between 4th and 8th magnitude (or fainter).

## Update 2

It seems that Neowise survived perihelion and observations in a bright sky suggest it is around 8<sup>th</sup> magnitude

## Update 3 28<sup>th</sup> Oct

It seems that P1 may be disintegrating from images taken today.

Other brightish comets include C/2020 M3 (ATLAS) at around 8<sup>th</sup> magnitude and currently moving through Orion and C/2020 S3 (Erasmus) at around 10<sup>th</sup> magnitude moving through Sextans. All of these are morning objects (including P1) and charts are given in the Newsletter for them. Don't expect another F3 though. These are all going to be telescopic comets only.

## Asteroids

A large asteroid – labelled (153201) 2000 WO107 – will sweep past Earth in late November, providing astronomers with a good opportunity to study it. Closest approach to Earth will happen on November 29, 2020 at 05:08 UTC; translate UTC to your time. The asteroid is an estimated 1,640 feet (500 meters, which is half a kilometre or 1/3 mile). It will pass at 11.19 times the Earth-moon distance.

## Deep Sky Objects

We will be trying to go through this list in the November (zoom) observing session as well as a couple of planets and maybe a comet, I hope you are able to join us.

**NGC 925** Barred Spiral Galaxy in Triangulum

**NGC 908** Spiral Galaxy in Cetus

**NGC 957** Open Cluster in Perseus

**NGC 1023** The Perseus Lenticular Galaxy

**NGC 1027** Open Cluster in Cassiopeia

**NGC 1055** Spiral Galaxy (edge on) in Cetus

**NGC 891** Spiral Galaxy (edge on), the 2nd best Galaxy in Andromeda and one of the best edge on galaxies. Note however that this galaxy is large and therefore has low surface brightness and may be a challenge to see visually if the skies are poor. On the best nights it will show the dust lane with larger instruments. It can be used as a test for transparency.

**NGC 1514** Planetary Nebula in Taurus (The Crystal Ball Nebula)

**Polaris**, The North Star, a binary with Polaris B, but is actually a triple star system with the much closer Polaris AB (Probably not resolvable with our amateur equipment though)

**M35** and **NGC 2158** Open Clusters in the constellation of Gemini, although apparently close together, the much fainter NGC2158 is some 9000 LY further away than M35

Clear skies

#### 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/AA\\_C4dqakRuUiYIJJHgz0KKqma?dl=0](https://www.dropbox.com/sh/9k7medirj1gkwlt/AA_C4dqakRuUiYIJJHgz0KKqma?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

AstroFest 2021 – as expected this has been cancelled but there will instead be an online event called worldwide astrofest in February. Details on [worldwideastrofest.com](http://worldwideastrofest.com)

**Observing evening:** As the Covid situation has not really improved and physical observing sessions cannot meet social distancing guidelines we have decided to look at virtual observing sessions for the near future,

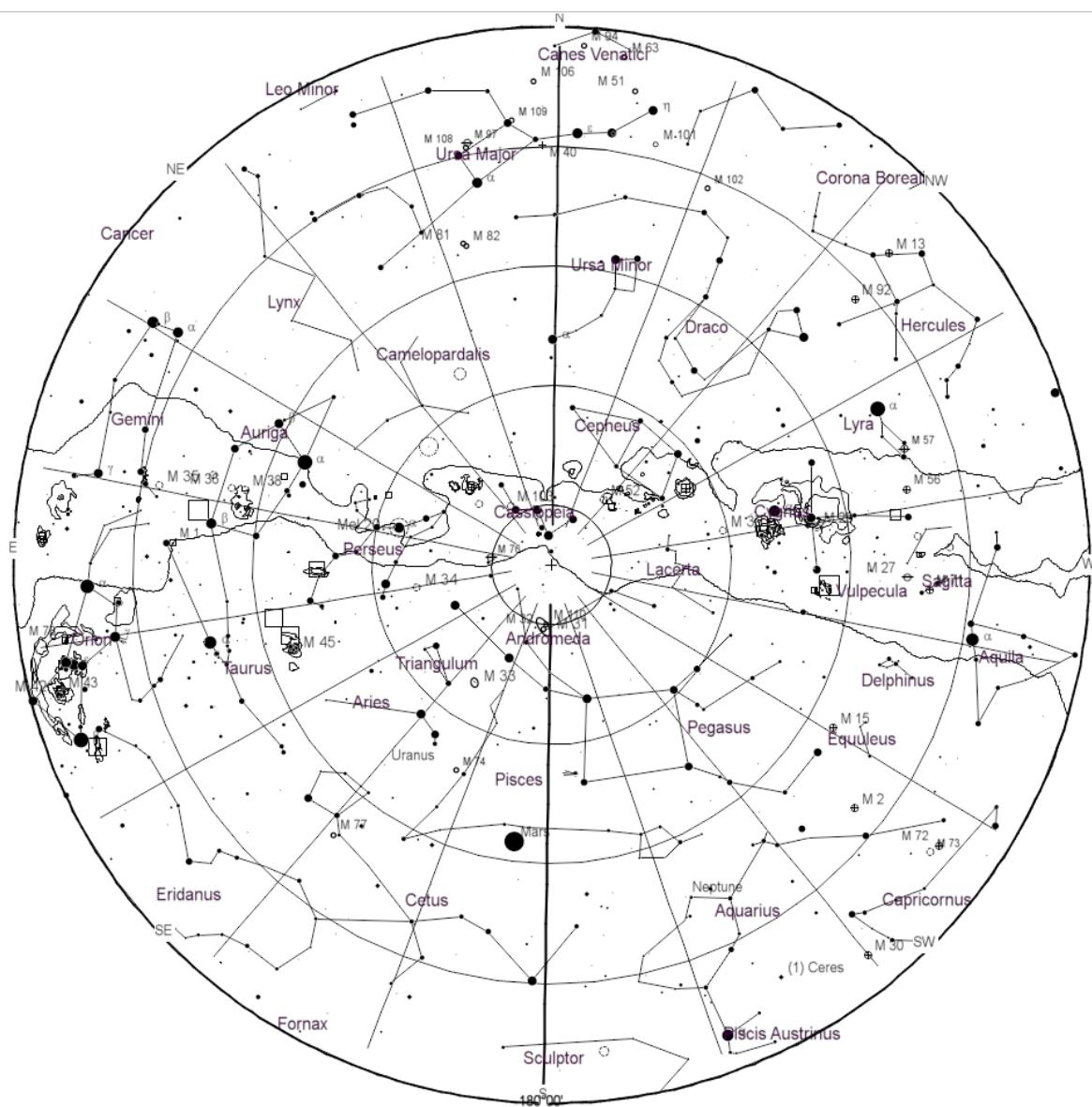
**Beginners meetings:** As we no longer have access to our hall due to the Covid situation we are going to be running a series of Zoom beginners meetings. The next one will take place on November 23<sup>rd</sup> and the topics to be covered include Open Clusters and Space Telescopes, although subject 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 21:00 (GMT) Sunday 15<sup>th</sup> November 2020



## MOON PHASES: NOVEMBER 2020

Moon phases and solar and lunar rise and set times for November 2020						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1  ↑17:17 ↓07:37 ↑07:08 ↓16:31 05:07 18:31	2  ↑17:39 ↓08:46 ↑07:10 ↓16:29 05:08 18:30	3  ↑18:07 ↓09:54 ↑07:11 ↓16:27 05:10 18:28	4  ↑18:44 ↓11:00 ↑07:13 ↓16:25 05:12 18:27	5  ↑19:31 ↓11:59 ↑07:15 ↓16:23 05:13 18:25	6  ↑20:29 ↓12:50 ↑07:17 ↓16:22 05:15 18:24	7  ↑21:38 ↓13:32 ↑07:19 ↓16:20 05:16 18:22
8  ↑22:54 ↓14:04 ↑07:21 ↓16:18 05:18 18:21	9  ↑-- ↓14:30 ↑07:22 ↓16:17 05:19 18:20	10  ↑00:14 ↓14:52 ↑07:24 ↓16:15 05:21 18:19	11  ↑01:38 ↓15:12 ↑07:26 ↓16:14 05:22 18:17	12  ↑03:03 ↓15:30 ↑07:28 ↓16:12 05:24 18:16	13  ↑04:29 ↓15:50 ↑07:30 ↓16:11 05:25 18:15	14  ↑05:59 ↓16:11 ↑07:31 ↓16:09 05:27 18:14
15  ↑07:29 ↓16:38 ↑07:33 ↓16:08 05:28 18:13	16  ↑08:58 ↓17:13 ↑07:35 ↓16:07 05:29 18:12	17  ↑10:20 ↓17:59 ↑07:37 ↓16:05 05:31 18:11	18  ↑11:29 ↓18:57 ↑07:38 ↓16:04 05:32 18:10	19  ↑12:21 ↓20:05 ↑07:40 ↓16:03 05:34 18:09	20  ↑13:00 ↓21:19 ↑07:42 ↓16:02 05:35 18:08	21  ↑13:28 ↓22:32 ↑07:43 ↓16:00 05:36 18:07
22  ↑13:50 ↓23:45 ↑07:45 ↓15:59 05:38 18:06	23  ↑14:07 ↓-- ↑07:47 ↓15:58 05:39 18:06	24  ↑14:23 ↓00:54 ↑07:48 ↓15:57 05:40 18:05	25  ↑14:37 ↓02:02 ↑07:50 ↓15:56 05:42 18:04	26  ↑14:51 ↓03:10 ↑07:51 ↓15:55 05:43 18:04	27  ↑15:06 ↓04:17 ↑07:53 ↓15:55 05:44 18:03	28  ↑15:23 ↓05:26 ↑07:54 ↓15:54 05:45 18:03
29  ↑15:44 ↓06:35 ↑07:56 ↓15:53 05:46 18:02	30  ↑16:09 ↓07:44 ↑07:57 ↓15:52 05:48 18:02					



PN G081.1-03.9 or IPHASX J205527.2+390359 - Ian Smith



Pelican Nebula (IC 5070) Tony Booer



E Veil

22 Oct 20 23:13:44  
C9.25 Hyperstar  
Atik 460EX

no darks, no flats  
asinh stretch  
80 stack

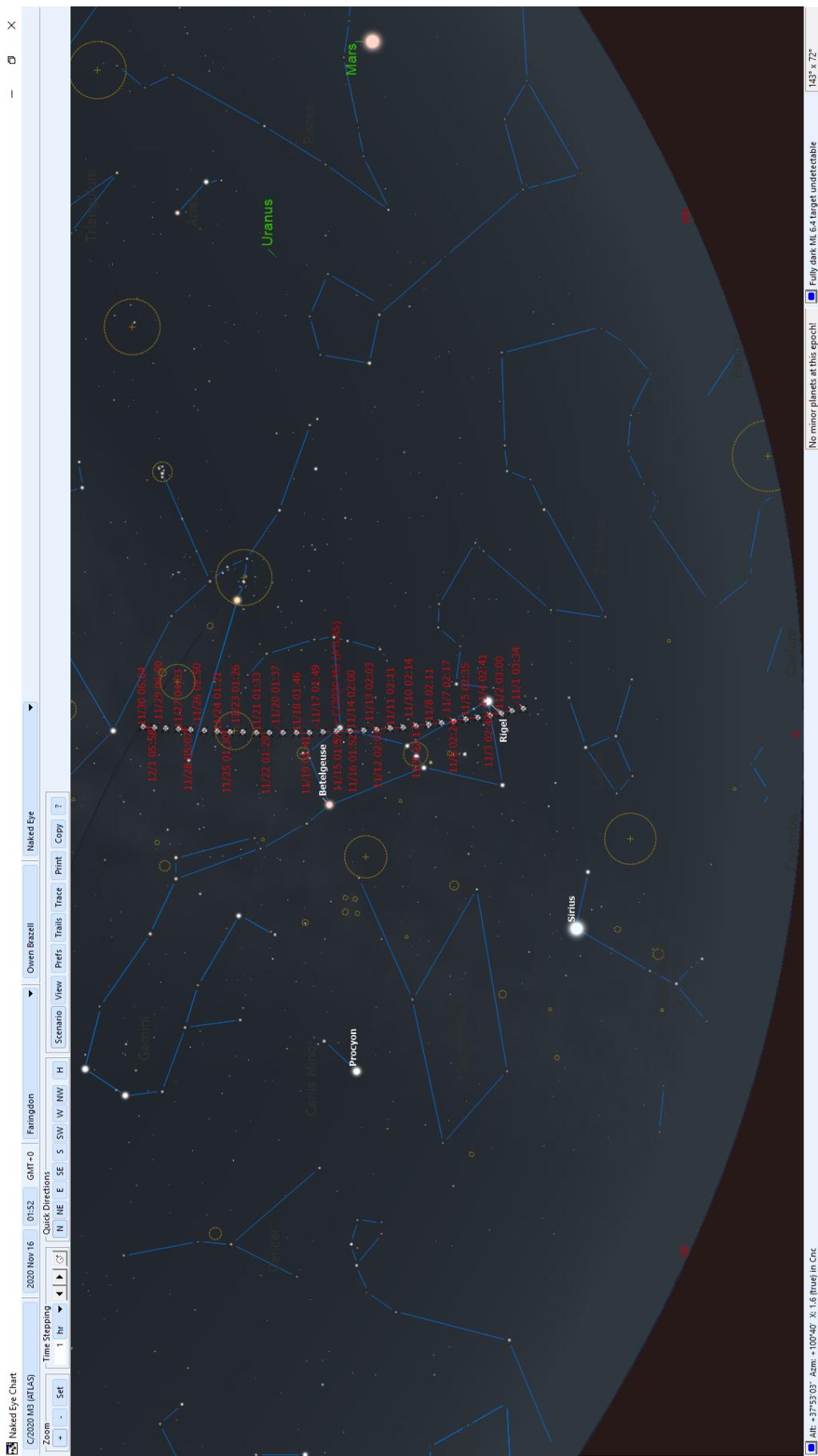
Tony Booer



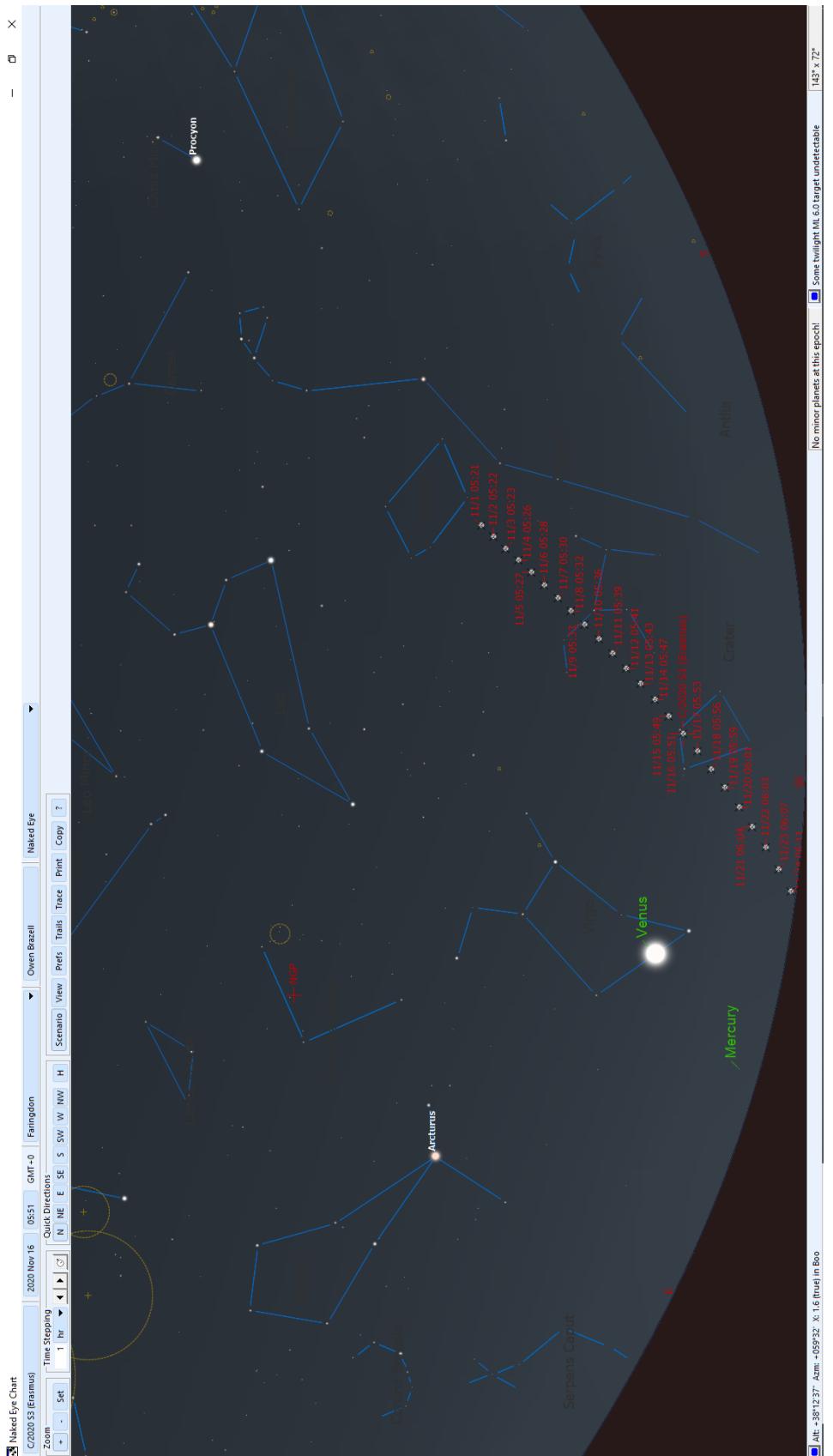
Supernova sn 2020uxz in NGC 514 – Steve Creasey



M45 – David Mainwaring



Path for C/2020 M3 (ATLAS) in November



Path for C/2020 S3 (Erasmus) in November

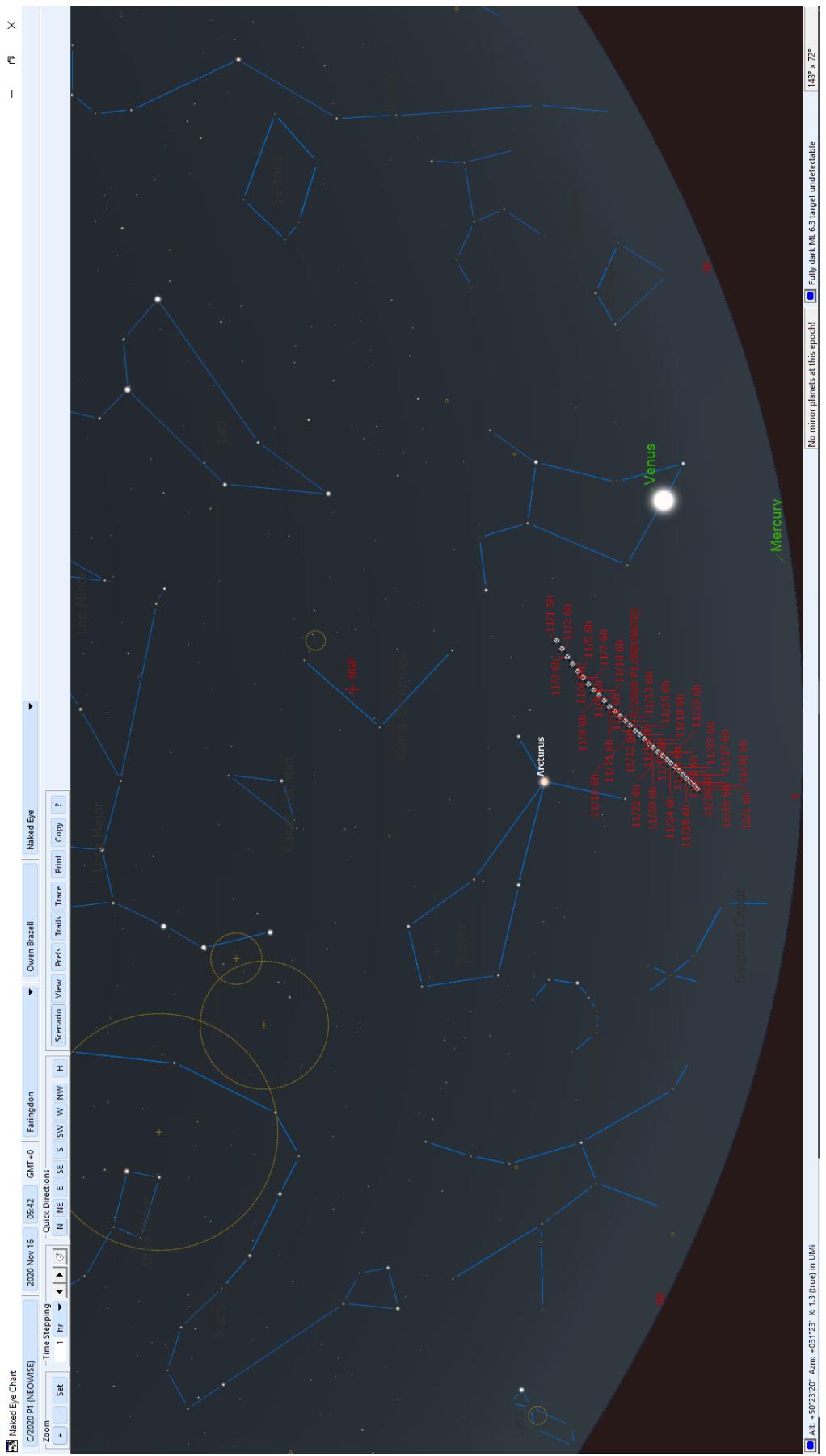
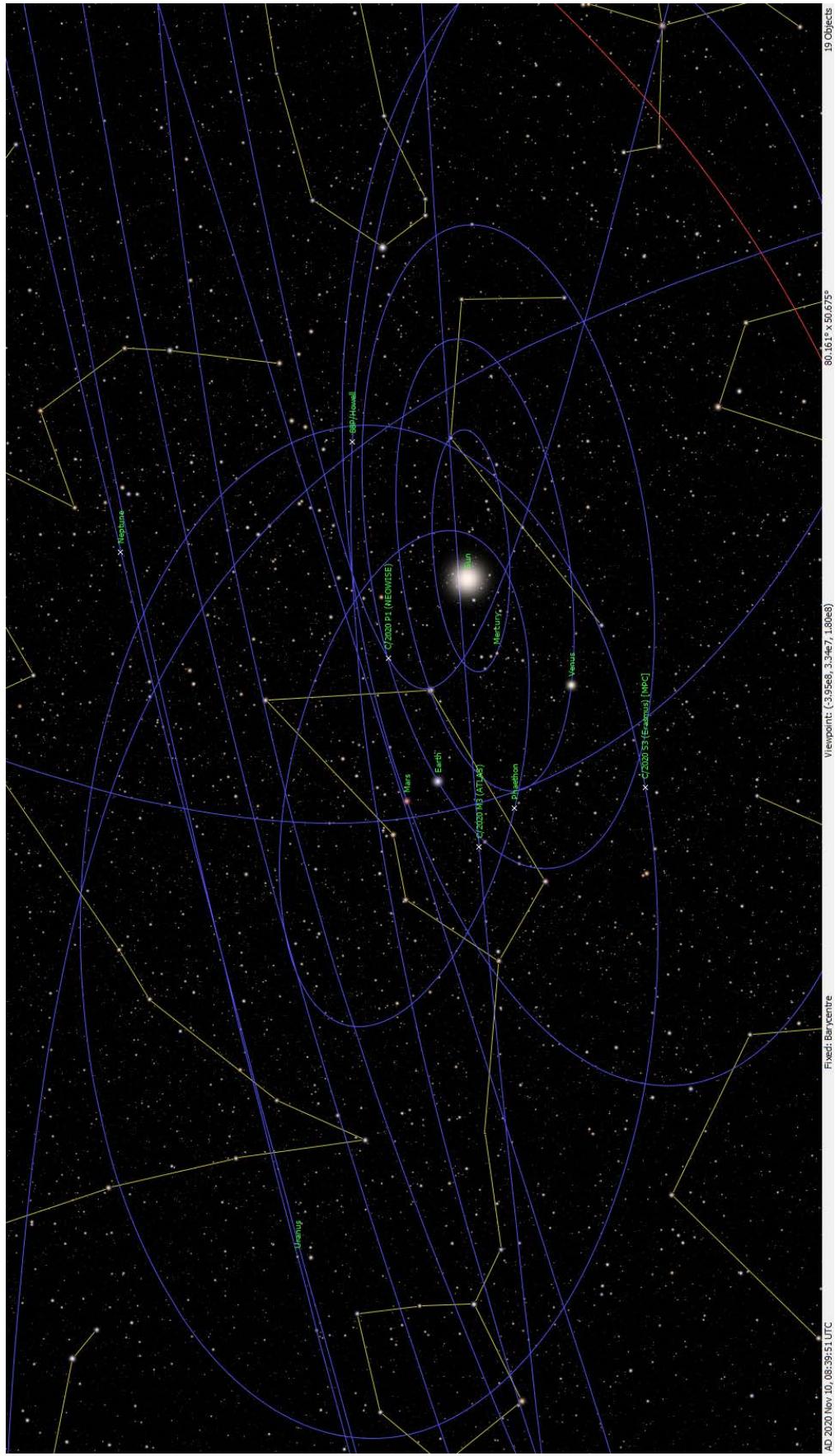


Chart for C/2020 P1 (NEOWISE) in November

## Orbits for Current Comets



## Beginners Meeting Program 2020/2021

### **2020/21 Long Talk**

<b>SEP</b>	Mars
<b>OCT</b>	How to Build a Star
<b>NOV</b>	Open Clusters
<b>DEC</b>	DSLR Imaging Part 2
<b>JAN</b>	Making the Elements
<b>FEB</b>	Types of Telescopes
<b>MAR</b>	A space mission TBA
<b>APR</b>	Celestial Co-ordinates
<b>MAY</b>	Dwarf Planets, Asteroids, & Comets
<b>JUN</b>	Imaging Planets

### **Short Talk**

Imaging V Visual Telescopes
Update on Bepicolombo
Star Hopping
Constellation
Stellarium
Asterisms
Constellation
Star Spectra
Sun in White Light
Astronomy 150-1543 AD: A 1400 year wait, and then Copernicus'