

# SPACEWATCH

the newsletter of the Abingdon Astronomical Society

8<sup>th</sup> March 2021

**Active Galactic Nuclei  
Professor Martin Hardcastle  
University of Hertfordshire  
Talk will be on Zoom**

## EDITORIAL

The shortage of images in this edition of Spacewatch I think summarizes the observing conditions over the last two months and as we head in to March it does not look a lot better. We also of course have the clocks going forward on the 28th of the month to make things worse. Interestingly had we stayed in the EU this would have stopped as there was an EU directive to stop the clocks moving twice a year. You have to stay on one time and that could be either summer or winter time. I imagine that we will have the usual bribed Tory MP's standing up in parliament to try and move us to something really stupid in terms of time zones eventually.

As Steve notes in his piece the successful landing of the rover Perseverance on Mars is likely to give us a flood of new images and of course the flight (hopefully) of its little helicopter. There are already lots of YouTube videos and the first panoramic view, which I have included here at the end of this issue if you have not already seen it.

As you will have seen the government guidelines mean that as suspected (and planned for) all the rest of the meetings this session will be on Zoom. What happens next session I think is still up for debate but will of course depend on the church hall and further measures. The likelihood of social distancing and mask wearing measures may yet mean that we will not be physically meeting this year. Unfortunately, from my point of view, this means that all the Spring star parties either have been or are likely to be cancelled. As suspected, as well there is now an increasing proliferation of Zoom talks and meetings, some of which Chris announces via the mailing list so if you have not had your fix of astronomy by actually doing it then you can listen to more of it. Unfortunately, there seems to be no single source for

these events to be listed and there is a lot of self-promotion going on for them on social media.

We hope to have a virtual observing session this month and it will be the last deep sky one this session as the sky gets too bright after the clocks go forward in April. If there is sufficient interest then we may look at trying to do another lunar one in April.

The society will be holding another virtual AGM in May so although the formal notice for this will go out in the next Spacewatch if you are thinking you might like to join the committee then please let Chris or myself know. The duties are not terribly onerous and we have about four committee meetings a year. The kind of help we are looking for is a web site manager and if we get back to physical meetings then we could do with someone to help out Steve with the observing evenings as Trevor has now left us for the sunny climes of Bognor.

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)

## REPORT OF LAST MEETING

February's talk

Prof Rene Breton is based in the Jodrell Bank Centre for Astrophysics which is part of Manchester University. Another Zoom opportunity and a very good one too.

He titled his talk in simple fashion: 'Pulsars and testing Gravity using them'.

He started by providing stats on pulsars. They never fail to amaze:

- Highly magnetized neutron stars (normally about 1.4 solar masses and a radius of around 10km)
- They can have a magnetic field 2,000 billion times stronger than Earth's magnetic field.
- If they are part of a binary system they can get spun up to phenomenal speeds because of their combined magnetic fields. That happens if one eats bits off the surface of the other as its progenitor star expands into supergiant stage.

The fastest that he's found so far spins at 1,399 times a second.

The slowest is 22.5 seconds per spin.

He played a recording of the spins of B0329. The recordings get stacked to make them audible and this one, with a spin of .714 milliseconds, sounds like a windscreen wiper! The Vela pulsar spins in .089 of a second. [FYI 11 beats a second - ish, and the Crab pulsar is around 33 beats a second.]

So far he has caught 2872 pulsars, 322 of which are classified as binary, with one in a triple system. The companion stars can be a normal star, or a white dwarf or another neutron star. We can only see a pulsar when particles get trapped in their concentrated magnetic fields. As the particles escape in the form of jets from the poles of the pulsar, we can then see these jets (like a lighthouse effect) if we happen to be in their line of sight. Most of the jets emit in radio waves but the pulsars themselves are very faint. The Crab pulsar is a rarity in that it is 12th magnitude.

Some pulsar jets show lumpy traces or show a notched peak. Prof Breton postulates that the jets are cone-shaped so there may be a hollow bit in the middle of the jet, but that can't explain all the lumpy bits on some traces. More research needed on this!

We were shown an excellent reconstruction of a neutron star and a secondary star evolving together, with the secondary getting matter pulled off it by the neutron star after the star becomes a red giant.\* As the neutron star gobbles up the stuff from this accretion disc, its angular momentum increases. This is what he calls pulsar recycling, and he says the fastest pulsars are the very old ones, that have been spun up a lot.

Prof Breton then gave us an excellent little revision of relativity. Always welcome. Every time I hear

explanations about relativity something becomes more clear. Special relativity concerns objects that are not moving or are moving at constant velocity. (Einstein's theory from 1905)

General relativity took a bit longer to work out and includes the effect of gravity and time dilation against mass and energy. This is the one that is usually demonstrated a heavy object causing a dip (gravitational well) in a two-dimensional space (space-time continuum). (Einstein 1915)

Prof Breton finds that double pulsars can reach relativistic speeds (where time dilation starts to take effect) as they orbit around each other. He gives an example of a binary whose components orbit in 2.4 hours and the orbit is the same size as the Moon's around the Earth. One pulsar rotates in 23 milliseconds and the other in 2.8 seconds.

Le Verrier noted an effect of gravity on Mercury's orbit in the 1840s but the science of the time could not explain it. Mercury has an elliptical orbit with a relativistic precession of 43" per century. Not just due to Mercury being so close to the Sun, but also from the effect of Jupiter's mass. The two aforementioned pulsars' orbit precesses to the tune of 17° per year. As they orbit they also give off energy in the form of gravitational wave radiation and their orbit is shrinking.

The first binary pulsar discovered was PSR B1913 + 16. Their orbit shrinks by 7mm a day. Unfortunately, they won't merge for another 85 million years or so, but they did earn their discoverers a Nobel Prize in physics (Hulse and Taylor). When they do finally merge, they are probably going to produce a black hole and the merger will produce a gamma ray burst.

Keep your eyes open for updates. Even the Earth gives off a little gravitational energy as it orbits round the Sun. (Equivalent to a candle light)

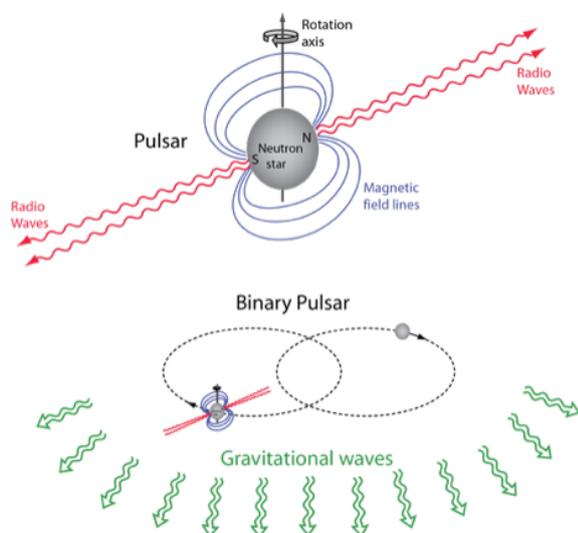
The Cassini orbiter around Jupiter on the far side in its orbit from us showed that the Sun was bending the light from Jupiter.

LIGO results also suggest there is a background level of gravity all around us.

As always with this kind of talk, you hear the words: ‘there’s a lot more to come and it’s just round the corner.’ Prof Breton was lovely to listen to and his passion for pulsars is evident. He mentioned also two pulsars almost edge on. There is a plasma cloud around them which causes eclipses.

\*A similar, excellent video of binary pulsar evolution is available on [nanograv.org](http://nanograv.org) (North America Nanohertz Observatory for Gravitational-waves).

The website hyperphysics also gives background to the aforementioned 1993 physics Nobel Prize.



## THE NIGHT SKY FOR MARCH 2021

### Steve and Cristina

February saw the magnificent achievement of the NASA Perseverance mission land on Mars (the video of which, you can find on the AAS Facebook page), sending back incredible images from the moment it landed.

The rover will be taking images, samples and for the first time ever, audio recordings. The rover is expected to be exploring the red planet for at least

two years. Hopefully we can learn much more about how the conditions used to be on the surface and if there was ever life on Mars.

As for terrestrial conditions, I need to try and be more positive about the weather we get, so.... the three or four clear nights we did get in February were great, and a couple of them had a nice bright moon to help me see my kit in the dark, saving money on torch batteries. Joking aside we did get a few decent nights, and I was able to do a bit of astrophotography, although after so long without using my kit, it was like learning to ride a bike again. Let’s hope for plenty of decent clear nights in March.

The March equinox occurs on March 20th at 09:27 UTC. The Sun will shine directly on the equator and there will be nearly equal amounts of day and night throughout the world. This is also the first day of spring (vernal equinox) in the Northern Hemisphere and the first day of fall (autumnal equinox) in the Southern Hemisphere.

### The Planets

**Mercury** – Visible as a morning object, rising shortly before the sun, having recently passing greatest elongation west on the 6<sup>th</sup>. Mercury's orbit lies closer to the Sun than the Earth's, meaning it always appears close to the Sun and is lost in the Sun's glare much of the time. It is observable for only a few weeks each time it reaches greatest separation from the Sun – moments referred to as *greatest elongation*. These apparitions repeat roughly once every 3–4 months, taking place alternately in the morning and evening skies, depending whether Mercury lies to the east of the Sun or to the west.

When it lies to the east, it rises and sets a short time after the Sun and is visible in early evening twilight. When it lies to the west of the Sun, it rises and sets a short time before the Sun and is visible shortly before sunrise.

However, some times of the year are more favourable for viewing Mercury than others. From London, it reaches a peak altitude of between 5° and 17° above the horizon at sunrise during each morning apparition, depending on

the time of year. During its February–March 2021 apparition, it peaked at 7° above the horizon at sunrise on 25 Feb 2021.

This variability over the course of the year is due to a combination of two factors - The inclination of the ecliptic to the horizon and Mercury's elliptical orbit.

**Venus** - will soon pass behind the Sun. From Abingdon, it is not readily observable since as it is very close to the Sun, and is in superior conjunction with the Sun on the 26<sup>th</sup> March.

**Mars** - is currently an early evening object, now receding into evening twilight. From Abingdon, it will become visible around 18:22 (GMT) as the dusk sky fades, 55° above your south-western horizon. It will then sink towards the horizon, setting at 01:08.

Mars is very close to the Pleiades in early March. How the Mars – Pleiades conjunction should look on the 4<sup>th</sup> March with my WO GT71 refractor and my Nikon D810, the two are close enough for a few days to be able to get them in this field of view, so hopefully we get an opportunity. (see diagram later in Spacewatch)

**Jupiter** - recently passed behind the Sun at solar conjunction. From London, it is not observable – it will reach its highest point in the sky during daytime and is no higher than 2° above the horizon at dawn.

**Saturn** - recently passed behind the Sun at solar conjunction. From Abingdon, it is not observable – it will reach its highest point in the sky during daytime and is no higher than 2° above the horizon at dawn.

**Uranus** - will soon pass behind the Sun at solar conjunction. From Abingdon, it will become visible around 18:55 (GMT) as the dusk sky fades, 36° above your south-western horizon. It will then sink towards the horizon, setting at 22:58.

**Neptune** – on March 11<sup>th</sup> Neptune will pass behind the Sun at solar conjunction. From Abingdon, it is not readily observable since it is very close to the Sun.

## Meteor Showers

There are no meteor showers peaking during March.

## Comets

This month sees the possible arrival of a bright (in astronomy terms) comet in C/2020 R4 (ATLAS) The comet itself seems intrinsically faint but its orbital geometry suggests that it may get to perhaps 6<sup>th</sup> magnitude at the end of March/April. Unfortunately, it is going to be a morning object and will also have to contend with the moon. I have included a chart for it later in the newsletter along with the orbital geometry. As always of course it may completely flop. As David Levy once said – Comets are like cats – they have tails and do what they want. There is however coverage of this pass in the March Astronomy Now. There may also be some in the March S@N but I don't get that.

Speaking of comets I kind of liked this news story [Comet Makes a Pit Stop Near Jupiter's Asteroids \(hubblesite.org\)](https://hubblesite.org/newsdesk/archive-news/2020/107) about a comet having a break on the way in.

## Deep Sky

**The Leo Triplet – M65, M66 and NGC 3628** – A small group of three spiral galaxies, around 35 million light years away in the constellation of Leo.



M66 - Hubble

**M96** – An intermediate spiral galaxy, 31 million light years away in Leo.

**NGC 2775** – A spiral Galaxy, 67 million light years away in Cancer.

**NGC 3242** The Ghost of Jupiter – A Planetary Nebula, 4800 light years away in the constellation of Hydra.

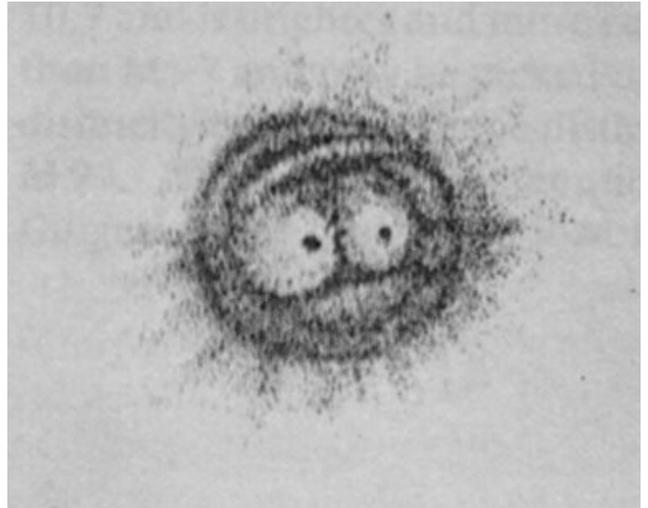


NGC 3242 from Hubble

**NGC 2835** – An intermediate spiral Galaxy, seen face on, 35 million light years away in Hydra.

**NGC 3521** – Is a flocculant intermediate spiral Galaxy, 26 million lightyears away in Leo.

**M97** The Owl Nebula – A Planetary Nebula, 2030 light years away in the constellation of Ursa Major.



Owl Nebula as seen by Lord Rosse with the 72" at Birr – after I suspect a bit too much Irish Whisky

**M81 & M82** Bode's Galaxy and the Cigar Galaxy, a spiral galaxy and a Starburst galaxy, 12 million lightyears away in Ursa Major.

**NGC 2146** – A Barred Spiral Star Burst galaxy, 70 million lightyears away in Camelopardalis

As well as the Mars – Pleiades conjunction in early March, the Milky Way is now appearing again in our morning sky, which is always fascinating to explore with a pair of binoculars, and makes for an interesting picture if you enjoy photography.

Clear Skies  
Steve and Cristina

## 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/9k7medirj1gkwt/AA\\_C4dqakRuUiYIJHgz0KKqma?dl=0](https://www.dropbox.com/sh/9k7medirj1gkwt/AA_C4dqakRuUiYIJHgz0KKqma?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.earth/>

**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 15<sup>th</sup> Mar. This is likely to be the last one this session as the skies are too bright from April onwards

**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 March 22<sup>nd</sup> and the topics to be covered include Space Mission and a constellation of the month although subject to change

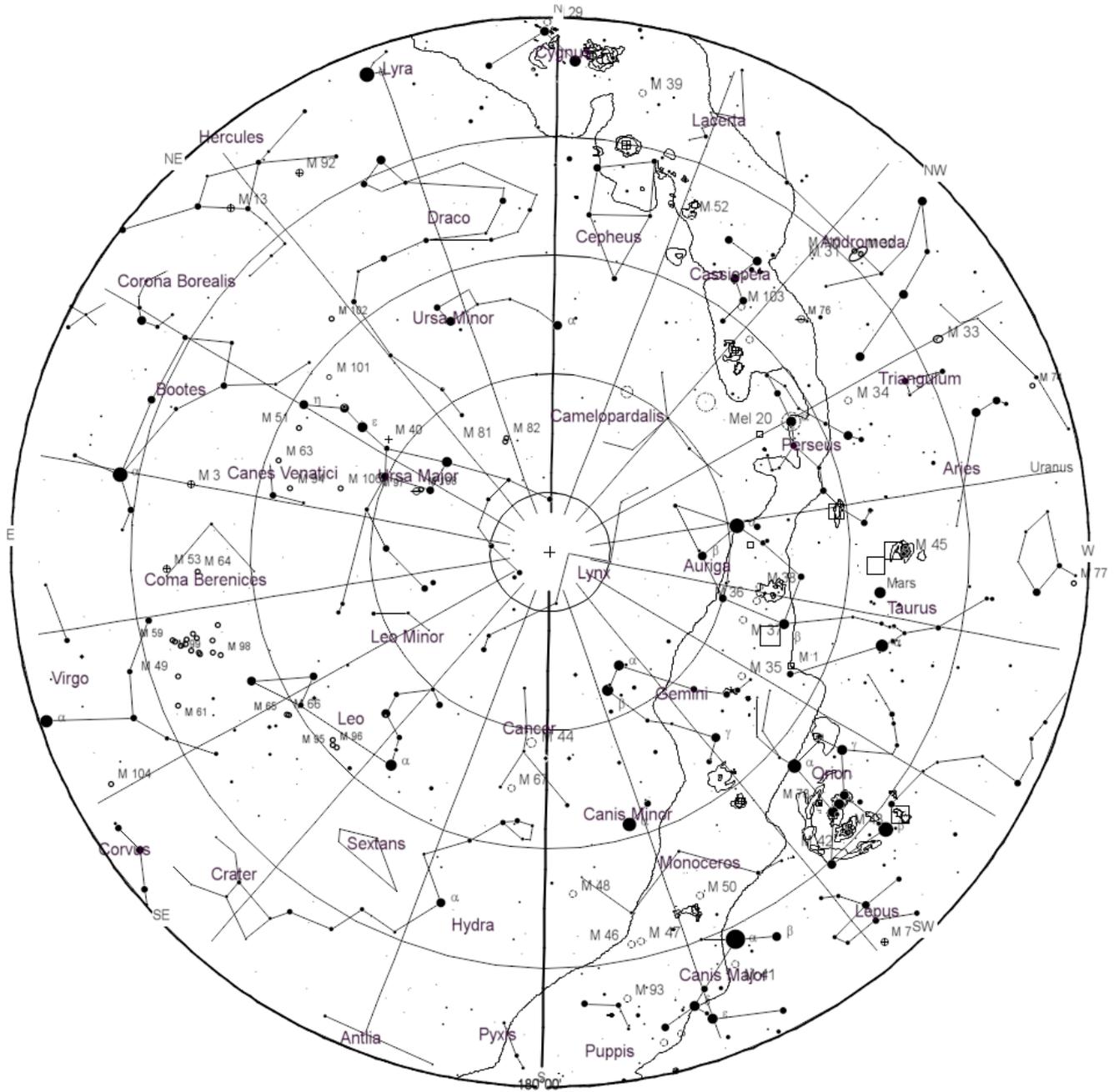
**New Mailing List:** If you have not already done so, why not subscribe to our new email mailing list. The list is called 'aaslist'. Members use the list to alert each other about celestial events and to chat about amateur astronomy. The list is quite active, with several messages most weeks. This will 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>

**BAA Deep Sky Section Meeting – 6th March** details at <https://www.britastro.org/node/24957> This will again be a Zoom meeting with two talks on Hubble's Variable Nebulae and discovering planetary nebulae. This is an afternoon meeting.

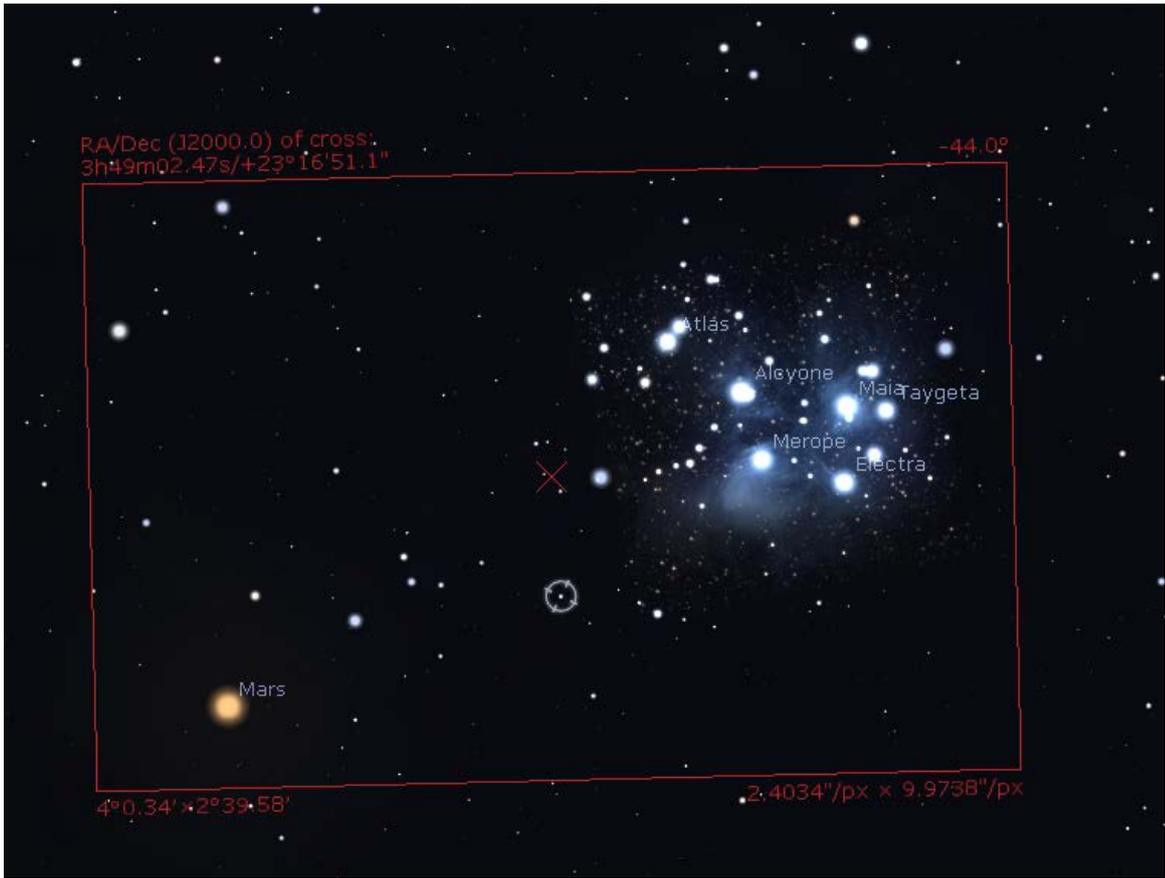
# STAR CHART

The night sky at 21:00 (GMT) Monday 15<sup>th</sup> March 2021



MOON PHASES: FEBRUARY 2021

Moon phases and solar and lunar rise and set times for March 2021						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1  ↑20:41 ↓08:10 ☀️ ↑06:57 ↓17:40 ☾ 05:00 19:38	2  ↑22:07 ↓08:27 ☀️ ↑06:55 ↓17:42 ☾ 04:58 19:40	3  ↑23:33 ↓08:46 ☀️ ↑06:53 ↓17:44 ☾ 04:55 19:42	4  ↑--: ↓09:09 ☀️ ↑06:51 ↓17:46 ☾ 04:53 19:44	5  ↑00:58 ↓09:37 ☀️ ↑06:49 ↓17:47 ☾ 04:51 19:46	6  ↑02:19 ↓10:12 ☀️ ↑06:46 ↓17:49 ☾ 04:48 19:47
7  ↑03:33 ↓11:00 ☀️ ↑06:44 ↓17:51 ☾ 04:46 19:49	8  ↑04:34 ↓11:59 ☀️ ↑06:42 ↓17:53 ☾ 04:44 19:51	9  ↑05:21 ↓13:09 ☀️ ↑06:40 ↓17:54 ☾ 04:41 19:53	10  ↑05:56 ↓14:24 ☀️ ↑06:37 ↓17:56 ☾ 04:39 19:55	11  ↑06:22 ↓15:40 ☀️ ↑06:35 ↓17:58 ☾ 04:37 19:57	12  ↑06:42 ↓16:55 ☀️ ↑06:33 ↓17:59 ☾ 04:34 19:58	13  ↑06:59 ↓18:07 ☀️ ↑06:30 ↓18:01 ☾ 04:32 20:00
14  ↑07:14 ↓19:18 ☀️ ↑06:28 ↓18:03 ☾ 04:29 20:02	15  ↑07:28 ↓20:27 ☀️ ↑06:26 ↓18:05 ☾ 04:27 20:04	16  ↑07:43 ↓21:36 ☀️ ↑06:24 ↓18:06 ☾ 04:24 20:06	17  ↑07:58 ↓22:45 ☀️ ↑06:21 ↓18:08 ☾ 04:22 20:08	18  ↑08:15 ↓23:54 ☀️ ↑06:19 ↓18:10 ☾ 04:19 20:10	19  ↑08:37 ↓--: ☀️ ↑06:17 ↓18:11 ☾ 04:17 20:12	20  ↑09:05 ↓01:02 ☀️ ↑06:14 ↓18:13 ☾ 04:14 20:14
21  ↑09:42 ↓02:07 ☀️ ↑06:12 ↓18:15 ☾ 04:12 20:16	22  ↑10:29 ↓03:06 ☀️ ↑06:10 ↓18:16 ☾ 04:09 20:18	23  ↑11:29 ↓03:56 ☀️ ↑06:08 ↓18:18 ☾ 04:06 20:20	24  ↑12:39 ↓04:36 ☀️ ↑06:05 ↓18:20 ☾ 04:04 20:22	25  ↑13:58 ↓05:08 ☀️ ↑06:03 ↓18:21 ☾ 04:01 20:24	26  ↑15:21 ↓05:33 ☀️ ↑06:01 ↓18:23 ☾ 03:58 20:26	27  ↑16:46 ↓05:54 ☀️ ↑05:59 ↓18:25 ☾ 03:56 20:28
28  ↑18:12 ↓06:12 ☀️ ↑05:56 ↓18:27 ☾ 03:53 20:31	29  ↑19:40 ↓06:30 ☀️ ↑05:54 ↓18:28 ☾ 03:50 20:33	30  ↑21:09 ↓06:49 ☀️ ↑05:52 ↓18:30 ☾ 03:48 20:35	31  ↑22:38 ↓07:10 ☀️ ↑05:50 ↓18:32 ☾ 03:45 20:37			



Mars and Pleiades conjunction simulation as seen on the 4<sup>th</sup> March from Steve's whats Up.



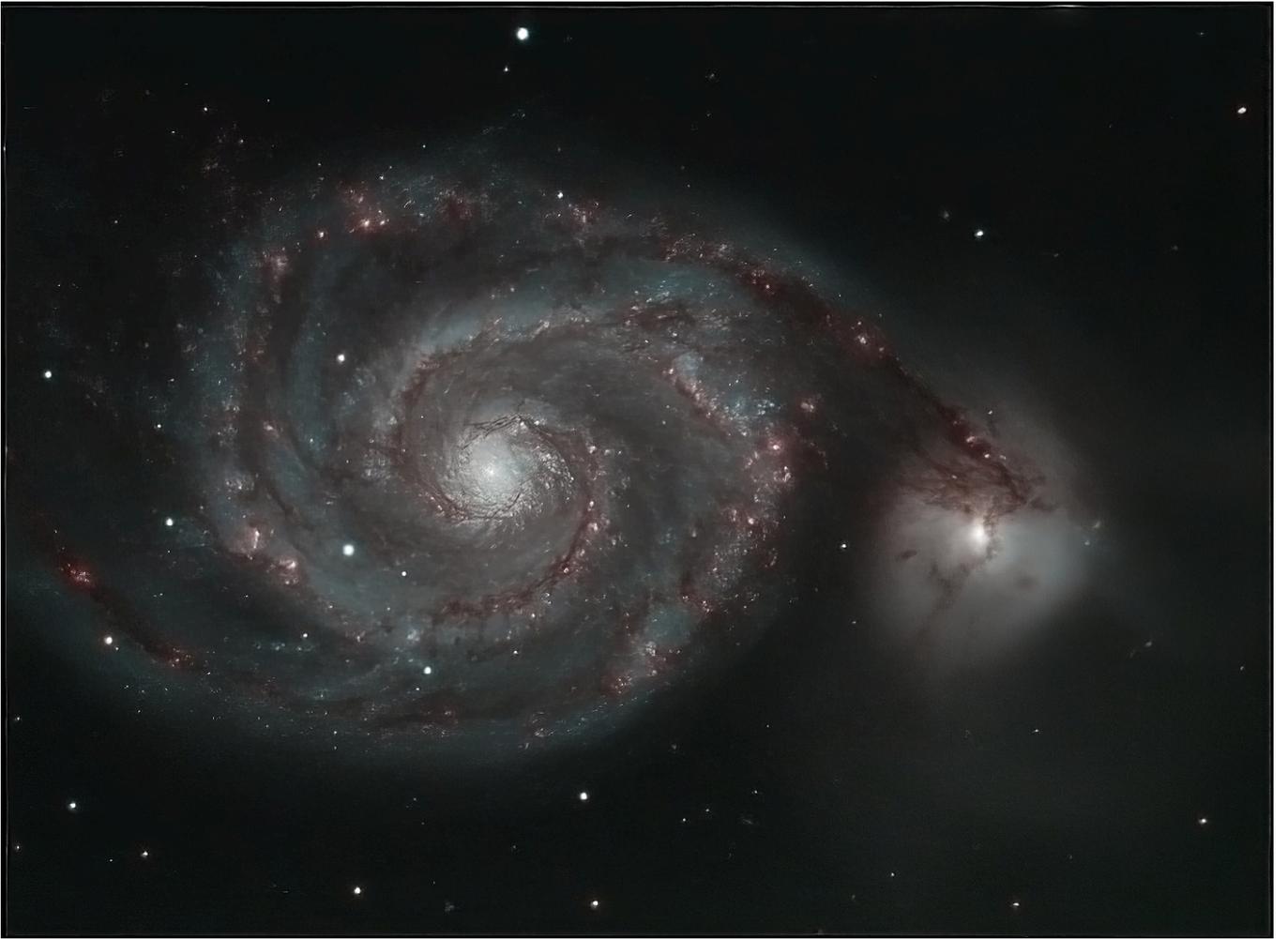
Flame Nebula in Orion – Steve Creasey



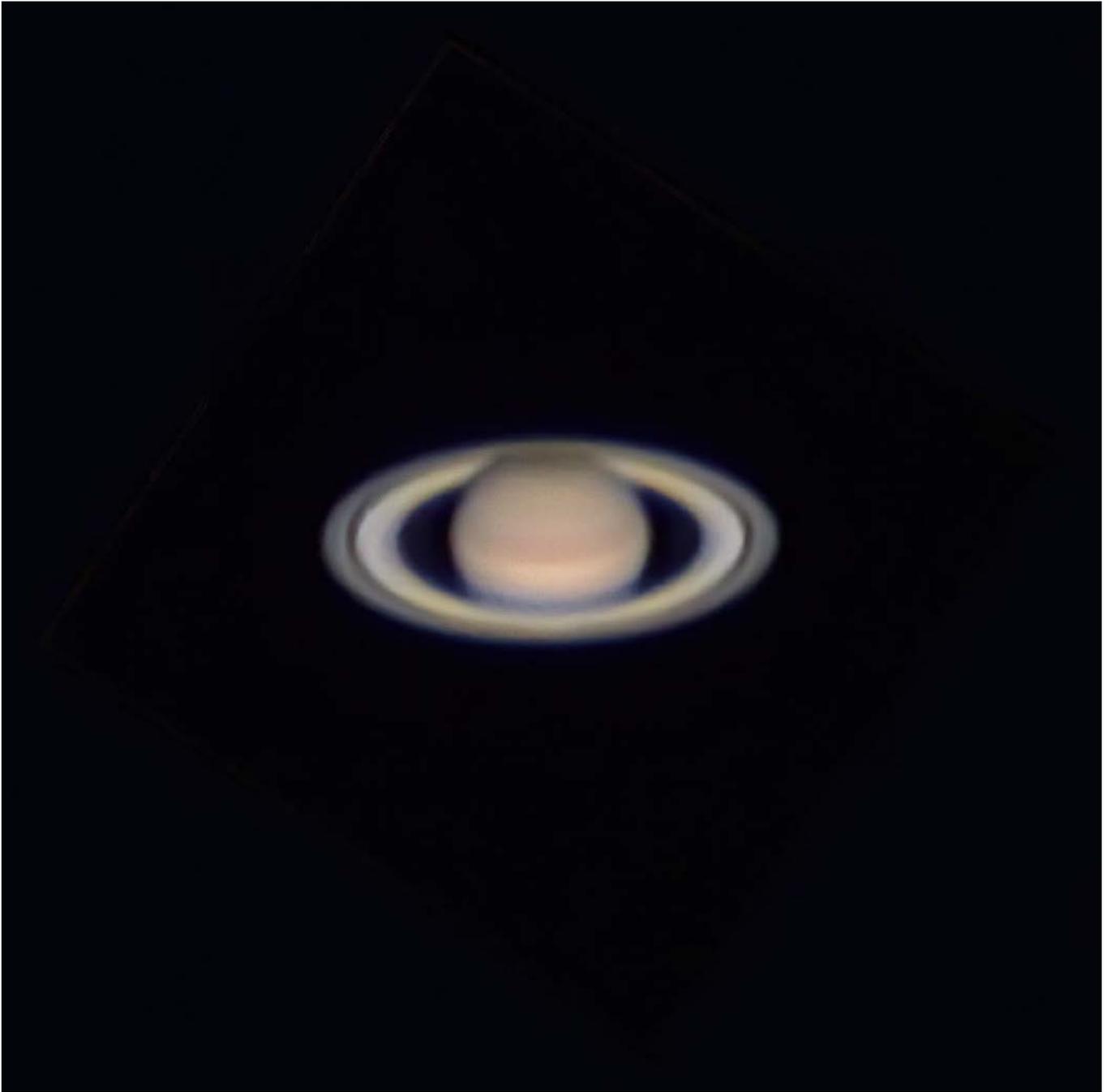
NGC 3169 and 3166 - Interacting galaxies, 75 million lightyears away in the constellation of Sextans. This is with around three hours of data, ideally I want to get another three to pull out some of the fainter detail.

8" RC scope ZWO asi294mc pro camera

Steve Creasey



M51 – John Napper



Hoping for a better year for Saturn and Jupiter, as they are a little higher. This was the best I could do with my 180 Mak this last year; still at least, the Encke Gap is visible.

Chris Pickford

## Beginners Meeting Program 2020/2021

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

**MAR** A space mission TBA

**APR** Celestial Co-ordinates

**MAY** Dwarf Planets, Asteroids, & Comets

**JUN** Imaging Planets

### **Short Talk**

Constellation

Star Spectra

Sun in White Light

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

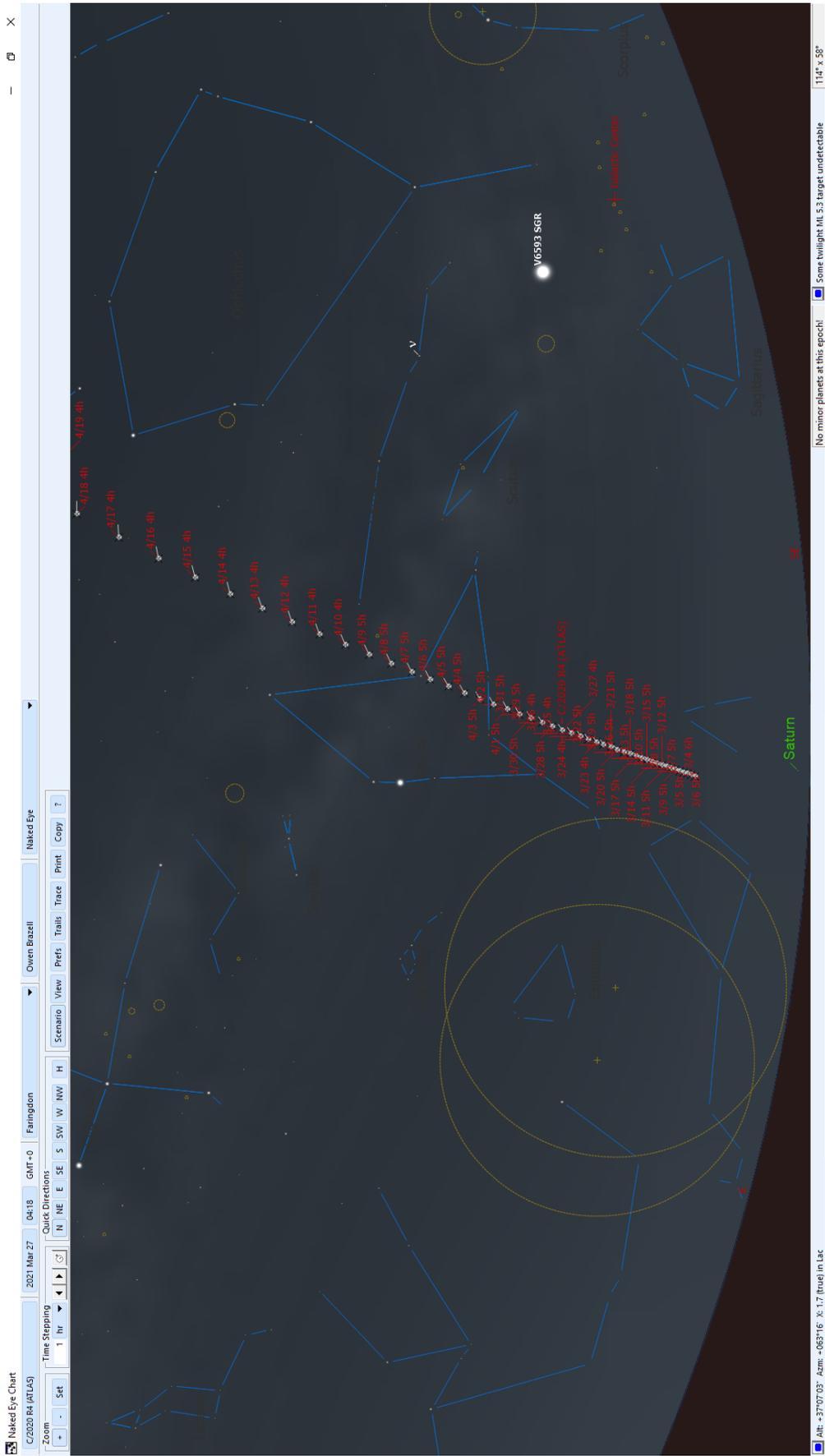
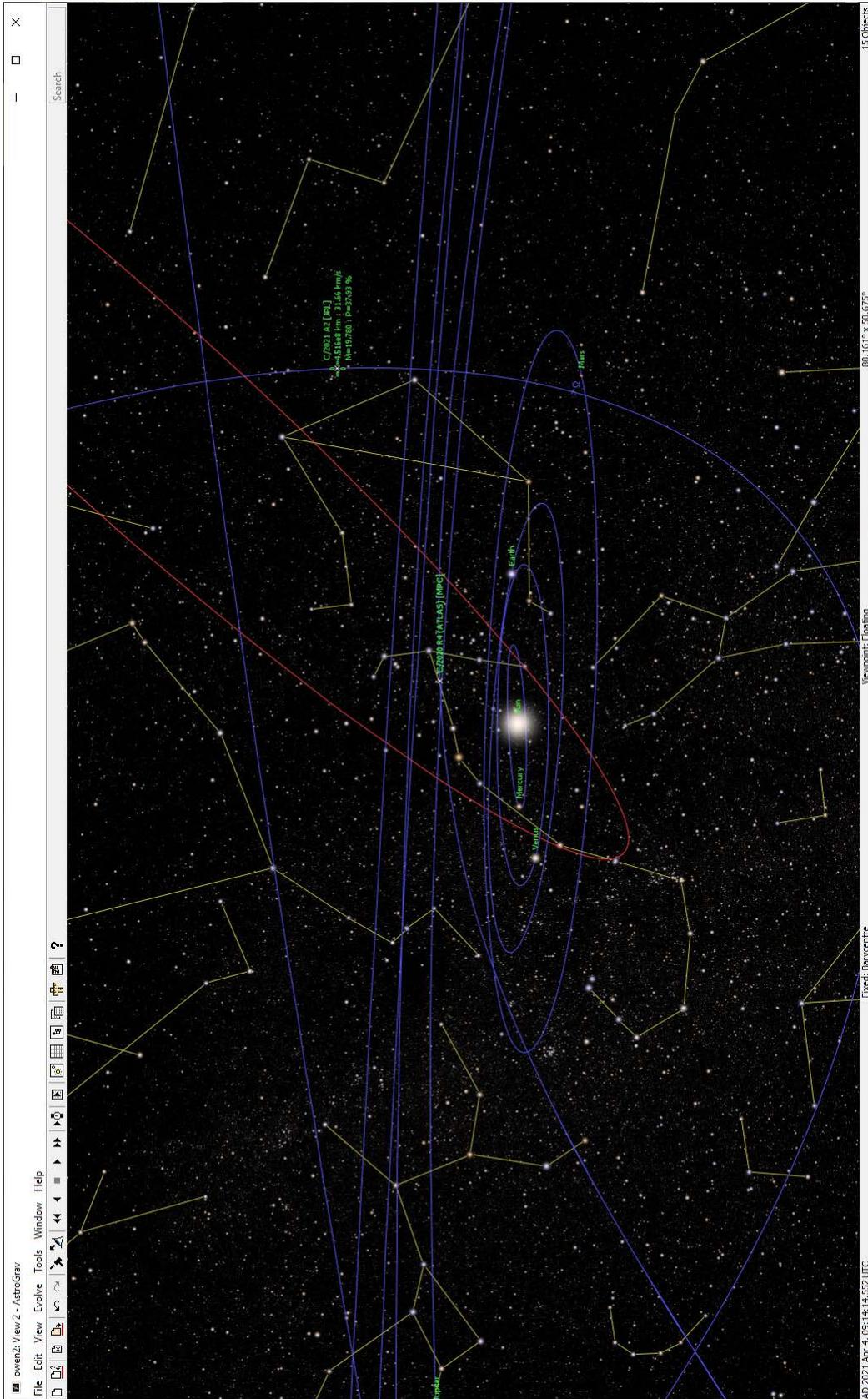


Chart for C/2020 R4(Atlas) for March and April  
From SkyTools 4



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

