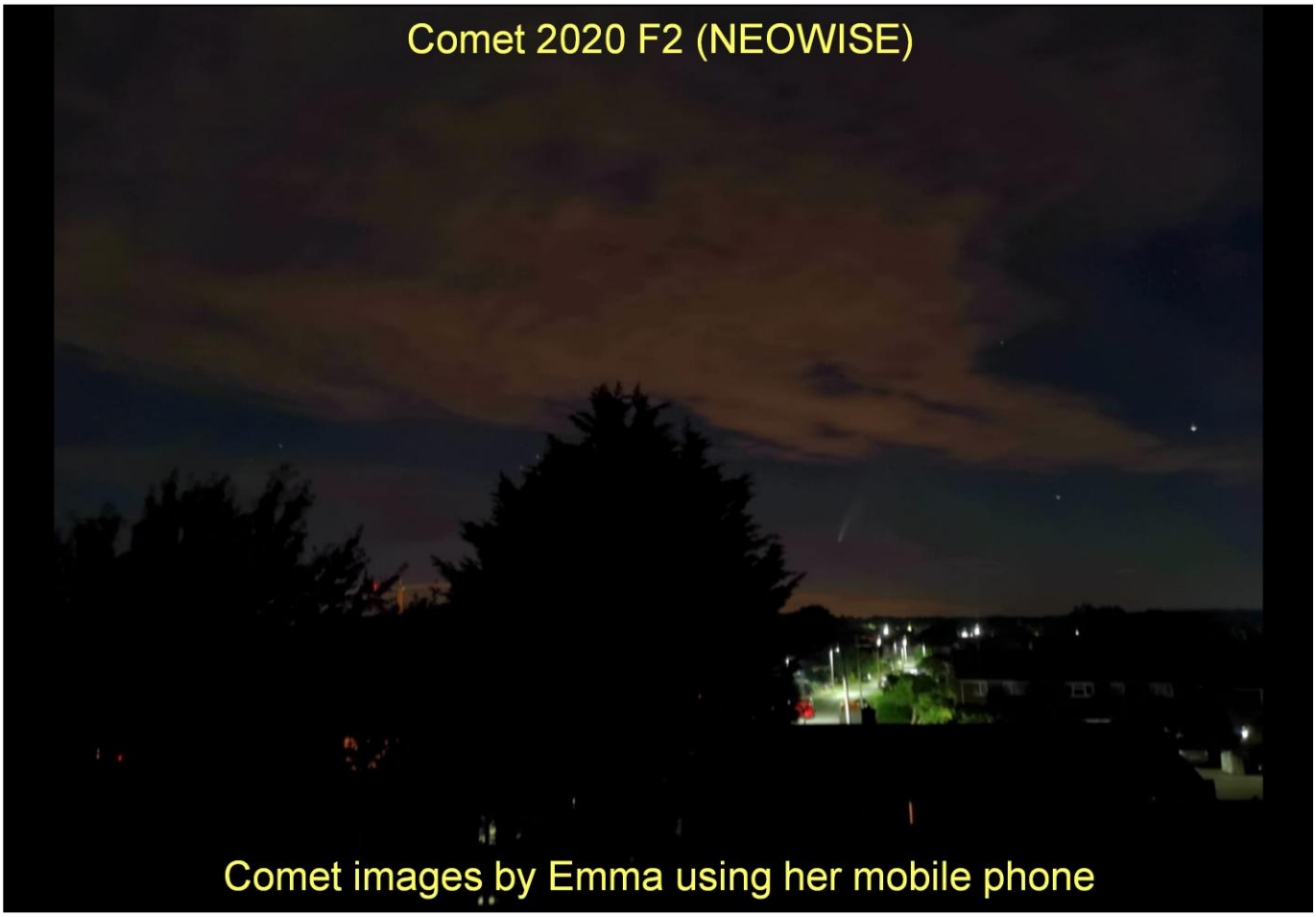
This presentation was given to the Newbury Astronomical Society Beginners 'Zoom' Meeting meeting on Friday 16th July 2020.

There are three special events in the night sky taking place this month, these are:

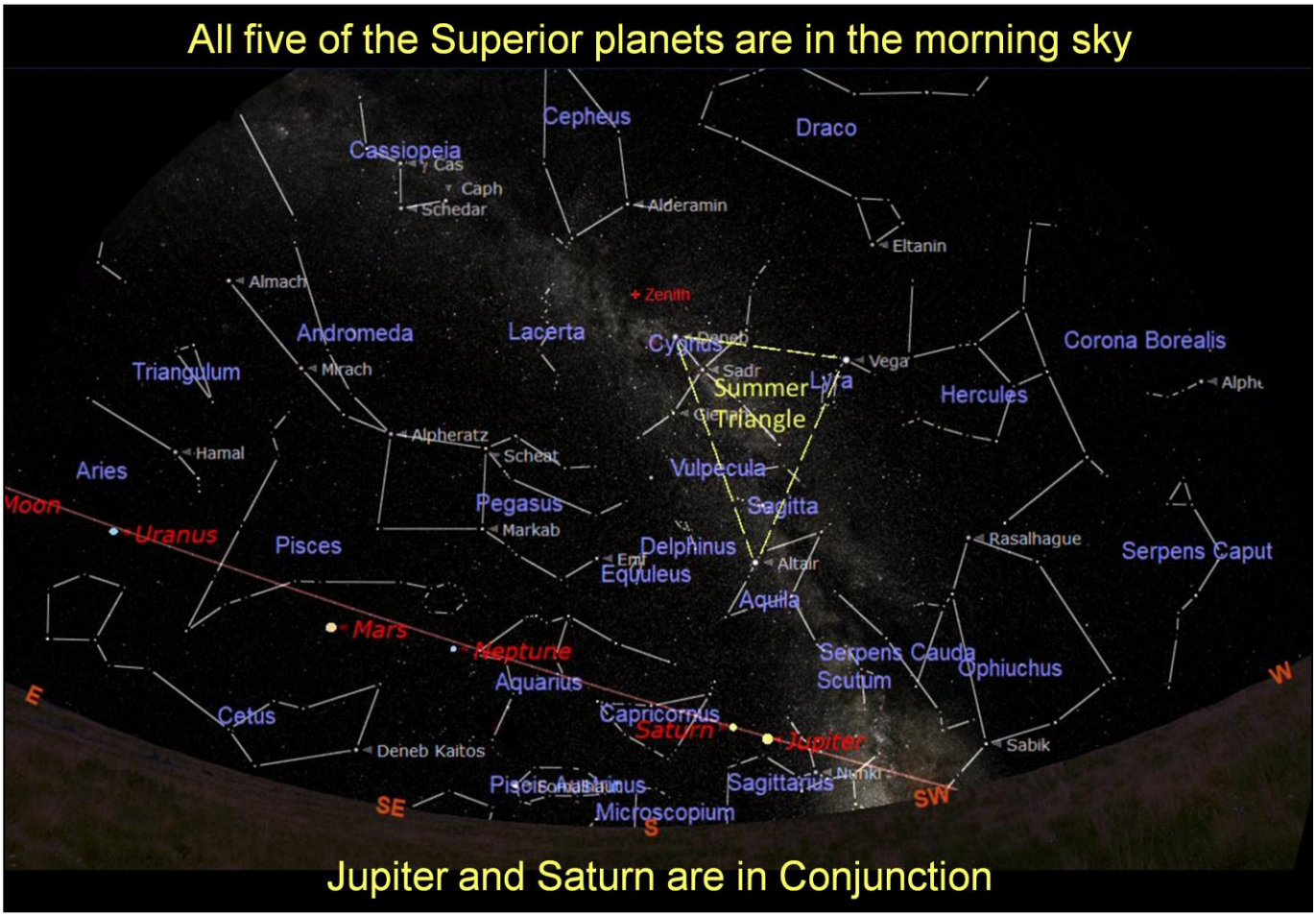
1 A CONJUNCTION of Jupiter and Saturn.

2 Jupiter will reach OPPOSITION on 14th July.

3 Saturn will reach OPPOSITION on 20th July.

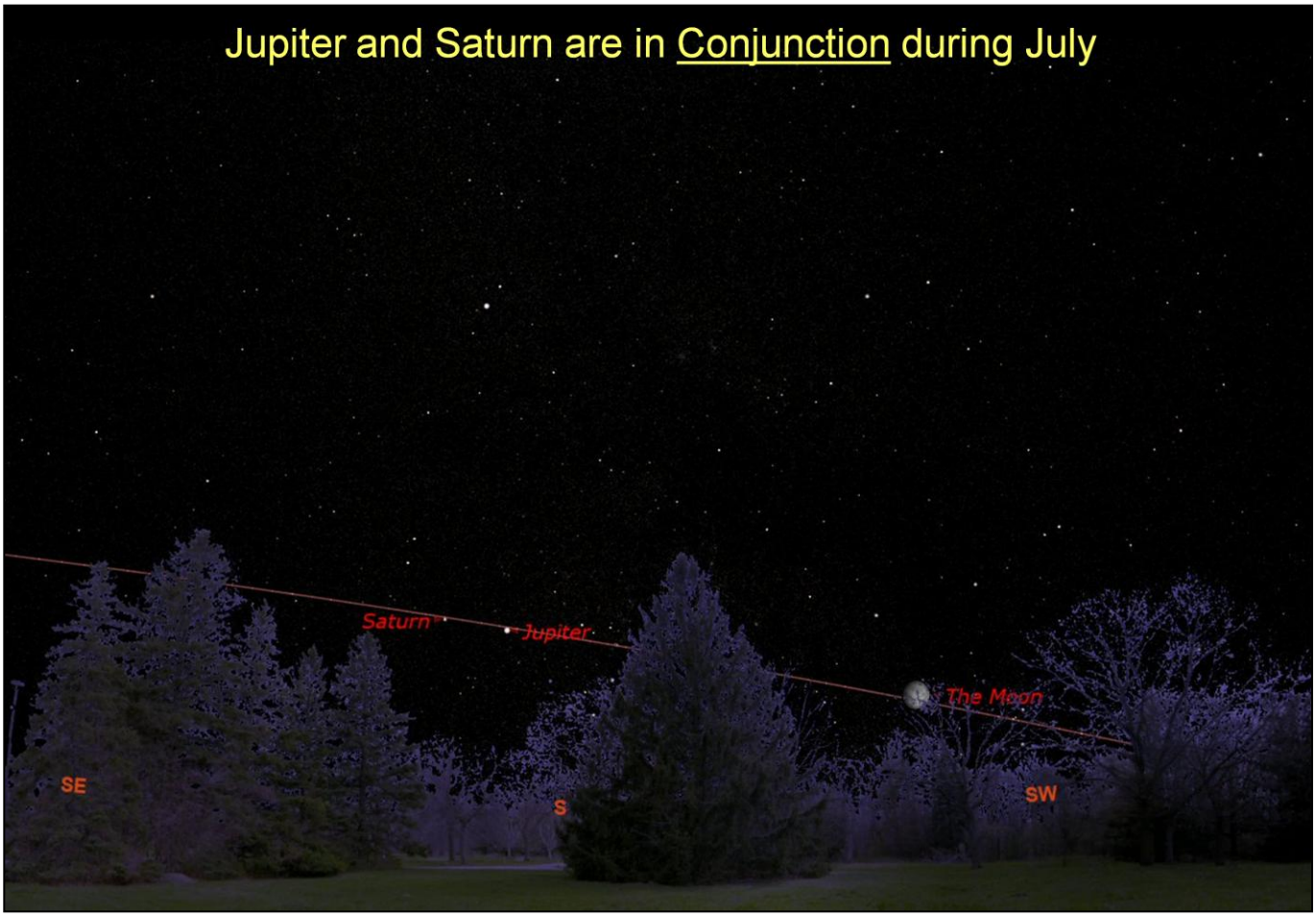


My daughter Emma took this picture of the comet from Thatcham through the open Dorma window of her son's bedroom in the roof, using her mobile phone camera.

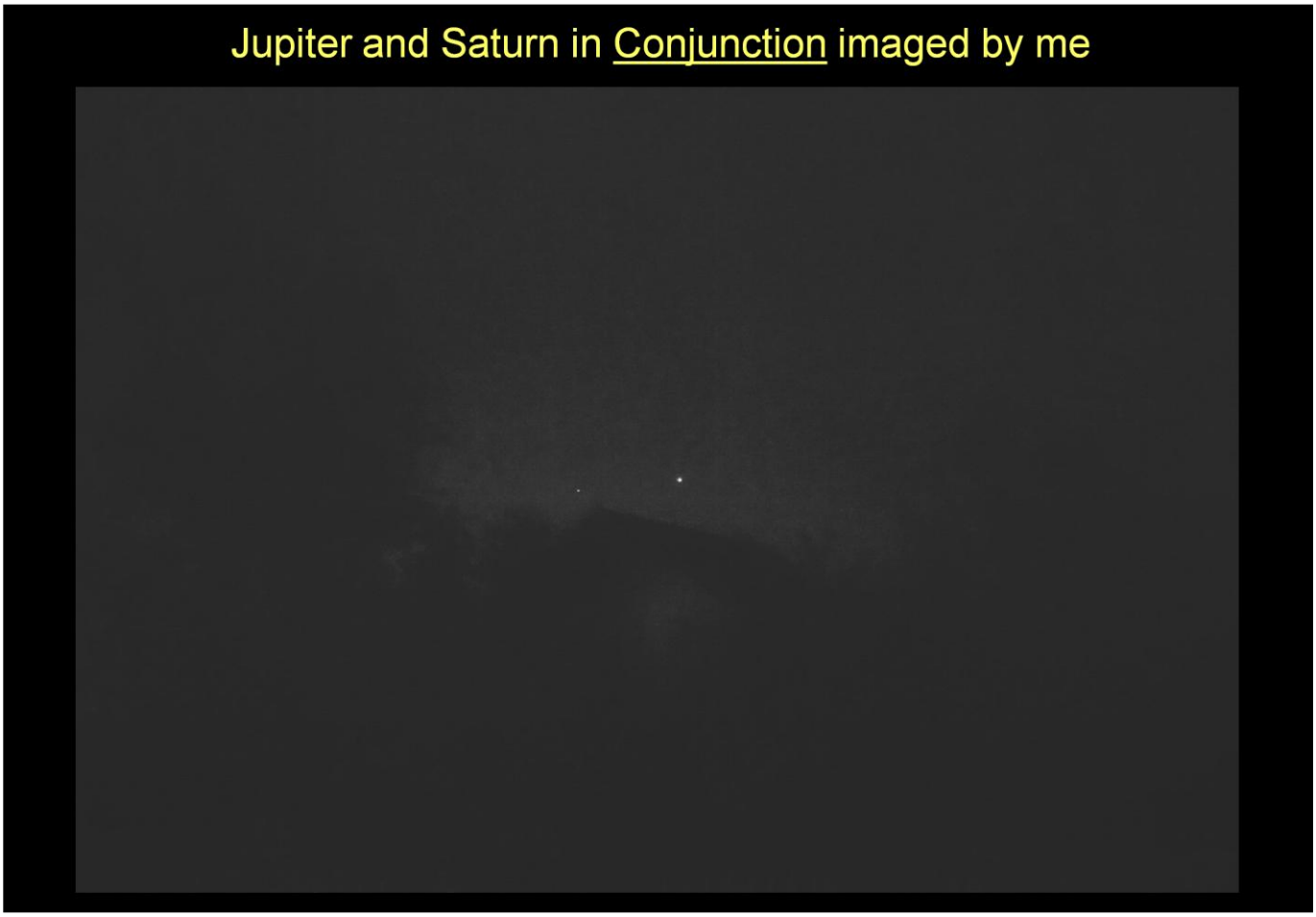


All five Superior Planets (outside the orbit of Earth) are early morning objects this month and Jupiter and Saturn will be in Conjunction.

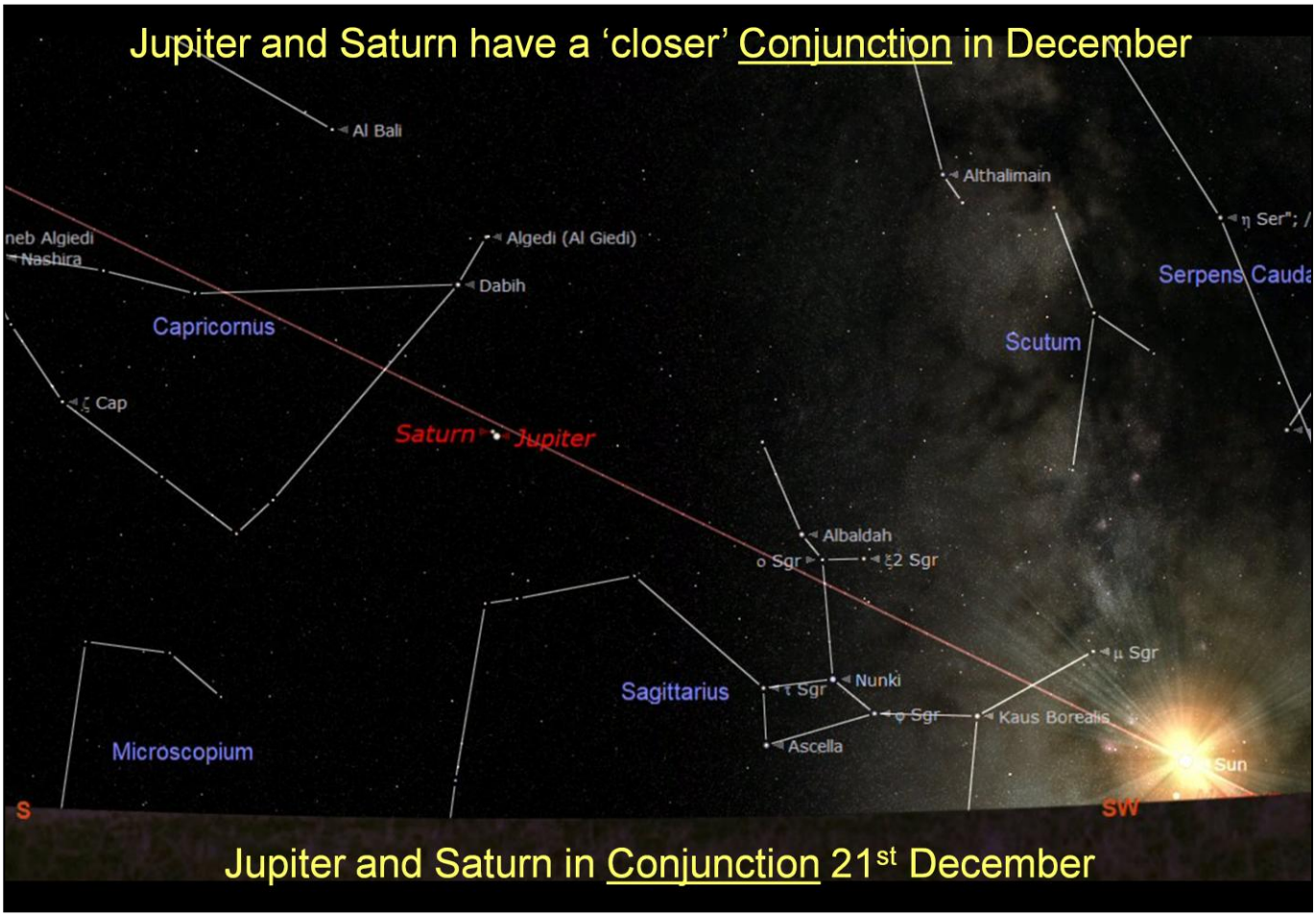
A CONJUNCTION occurs when two or more bodies appear to approach and become close to each other. This month and for the rest of this year Jupiter and Saturn appear close together in the sky. This is just a 'line of sight' view the planets are not actually close together. Jupiter and Saturn are not very close at the moment and will be at their closest on 21st December 2020.



Steve Harris attempted to take a picture of the Conjunction of Jupiter and Saturn at 03:00 on 3rd July but trees, 'misty' cloud, the brightening sky and a nearly flat camera battery thwarted the attempt so here is an approximate computer simulation of the view between the trees.



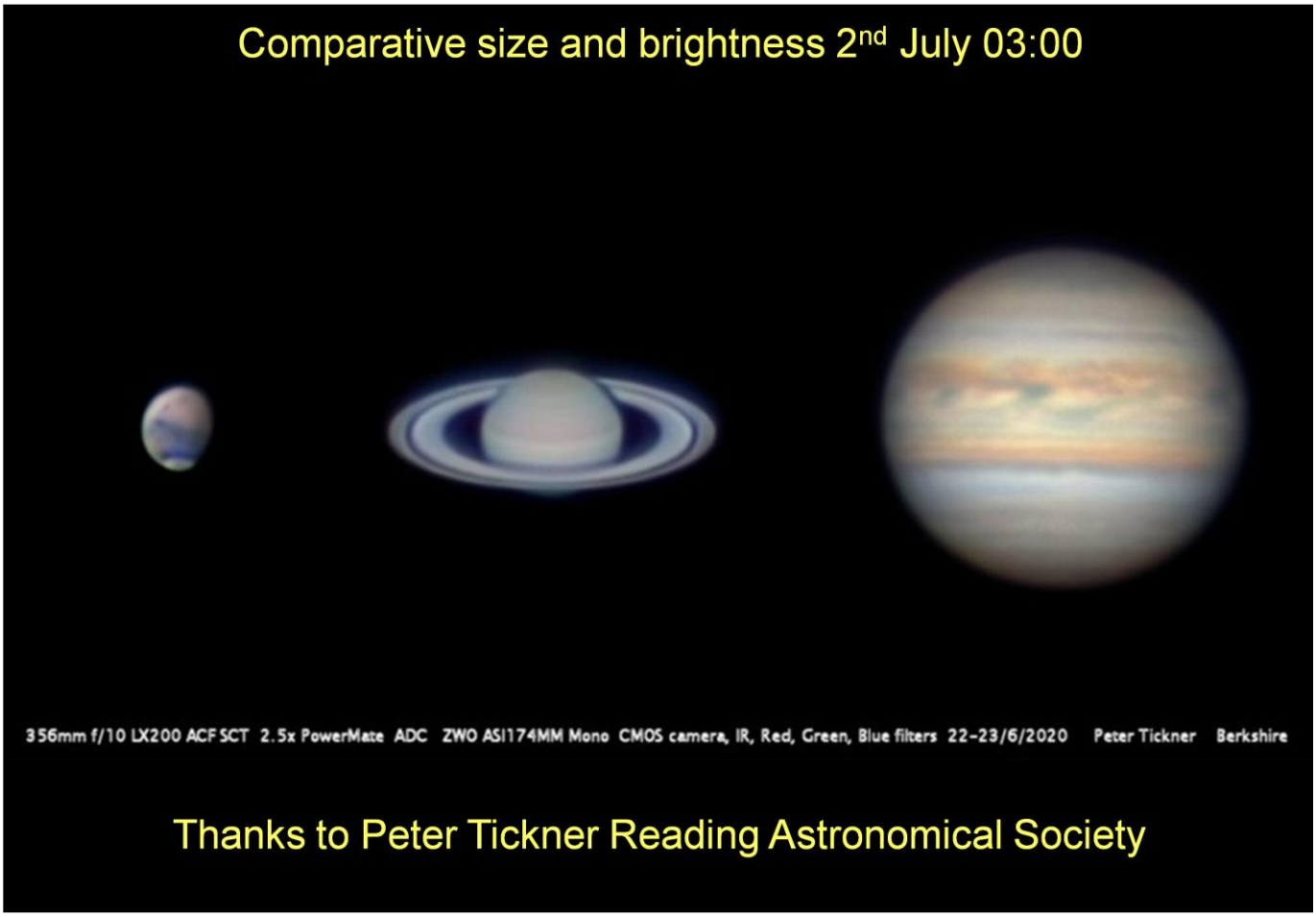
But he did get this rather ‘iffy’ picture of Saturn and Jupiter rising over a neighbour’s roof using a mobile phone camera. A real shot in the dark but it did come out ok.



During December 2020 there will be a much closer conjunction of Jupiter and Saturn. Closest on 21st December.

On this computer generated image the orbital paths have been added. This is the conjunction on the 20th December on the 21st December it will be at its closest.

The two images above were generated using the Starrynight planetarium application and show how Jupiter and Saturn and their moons will appear on 19th and 21st December. So this is how they are expected appear in a good pair of binoculars or a small telescope.

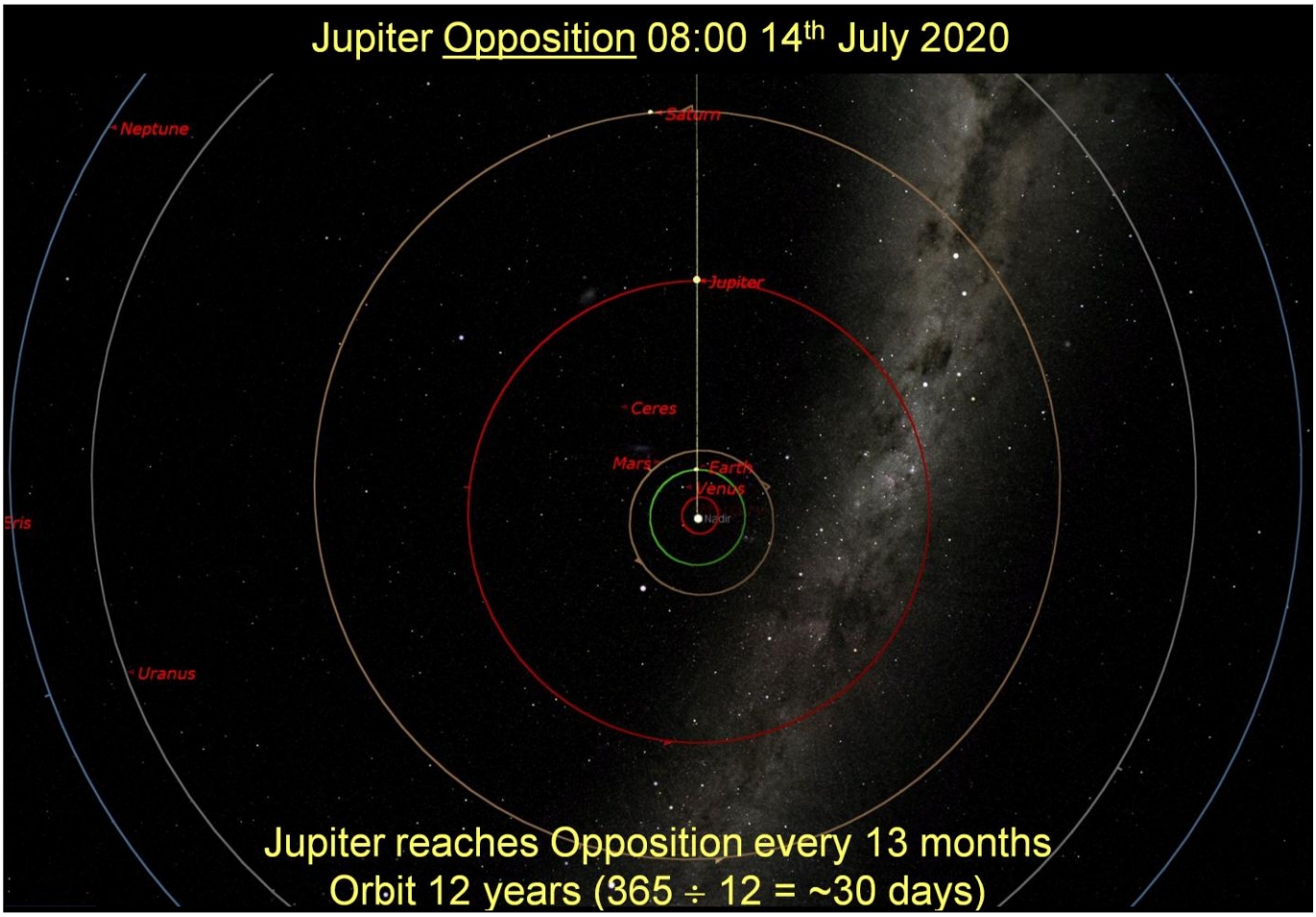


Although Saturn is almost as big as Jupiter it appears much smaller and fainter in the night sky because it is about twice as far away as Jupiter. So it appears only half the diameter and a quarter of the area of Jupiter.

Saturn not only receives about just a quarter of the sunlight per metre that Jupiter receives, we only receive about a quarter of that reflected light from Saturn compared to the amount that Jupiter reflects. This is due to the Inverse Square Rule (twice the distance the means the light density is reduced to a quarter.

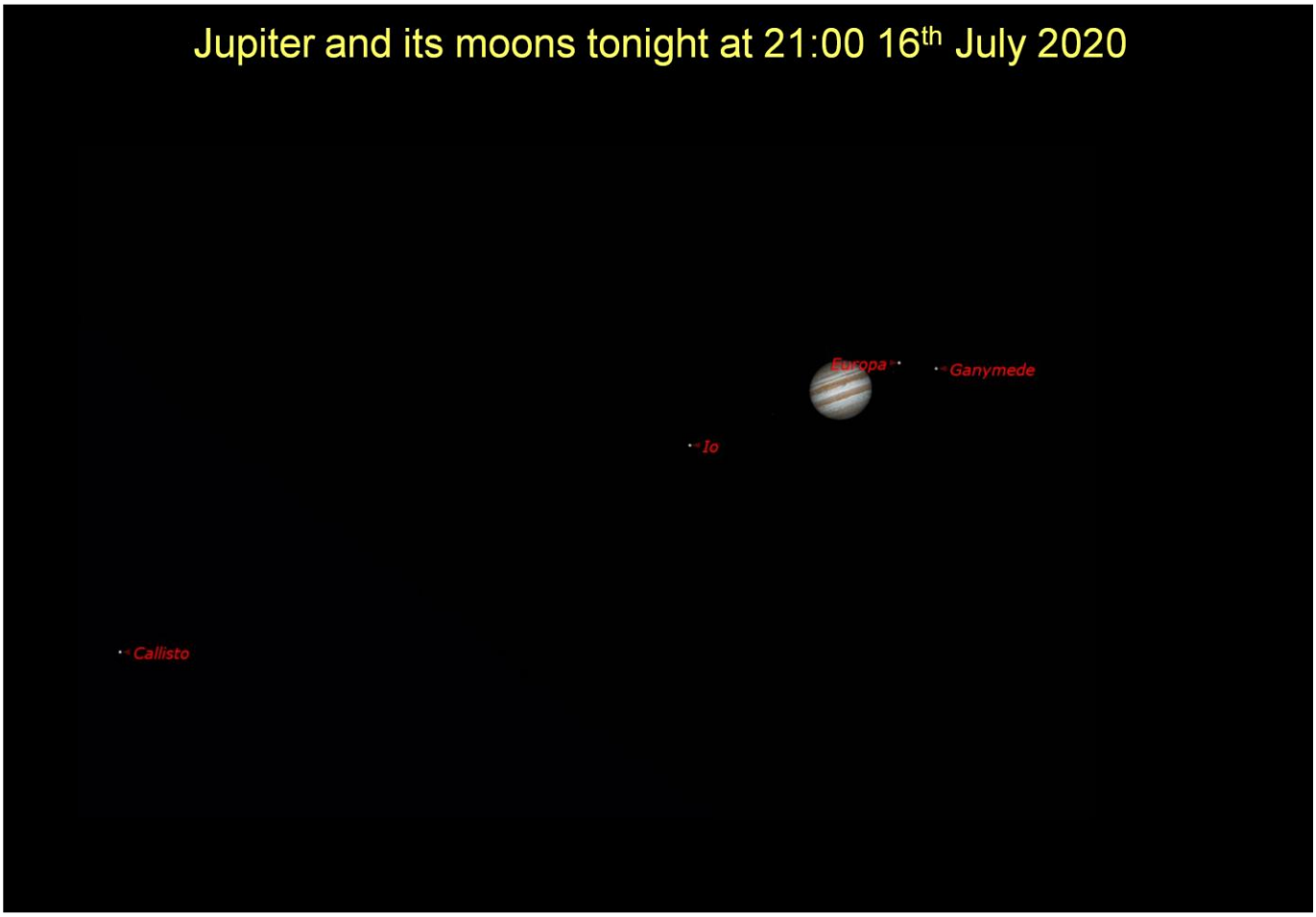
So adding this together (appears half the size, at twice the distance and half the sunlight) we only receive less than 1/16th the amount of light we receive from Jupiter.

We can add some more light reflected from the ring system but Saturn still appears much smaller and fainter than Saturn.

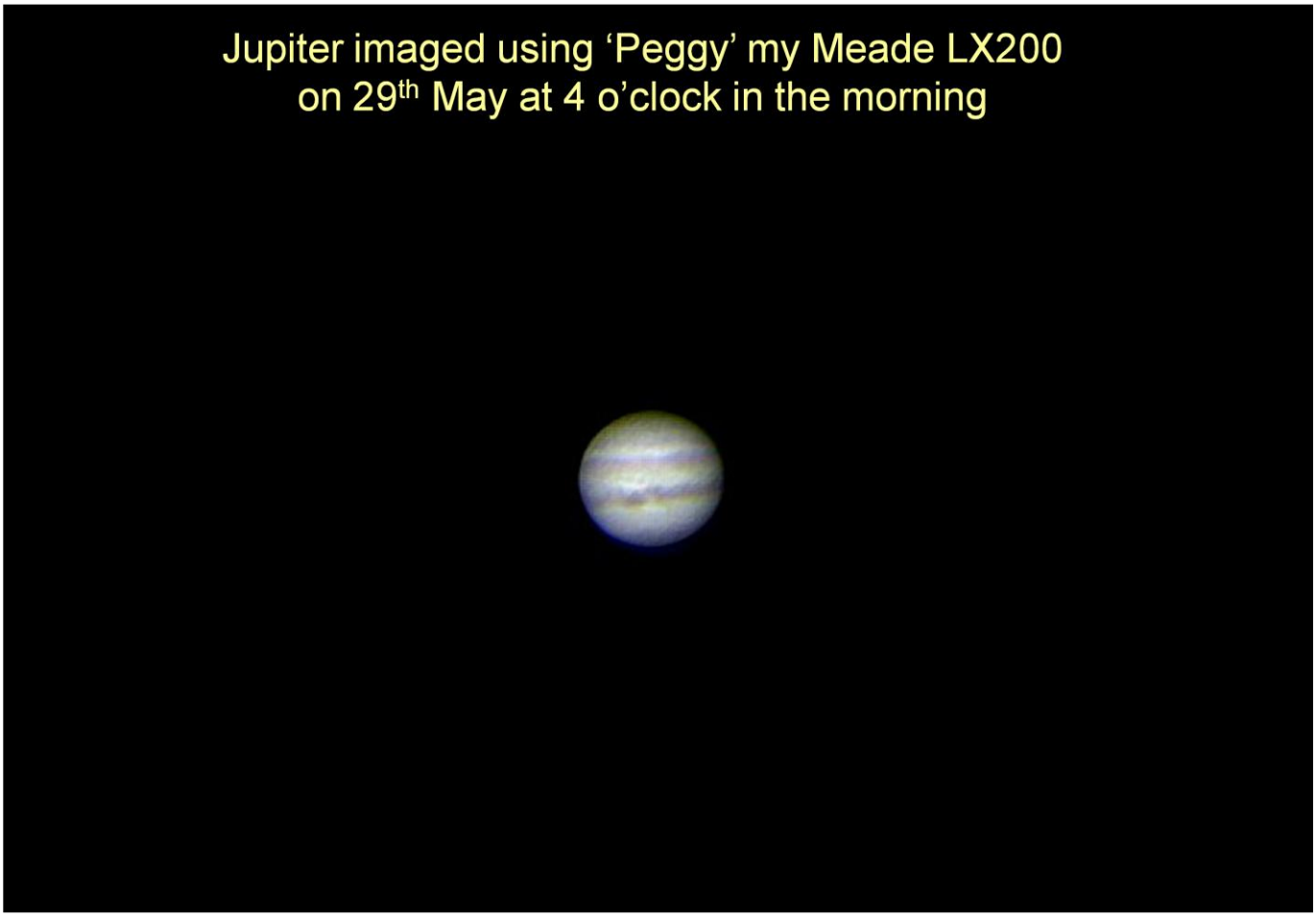


Jupiter reached OPPOSITION on 14th July at 08:00 (8 o'clock in the morning).

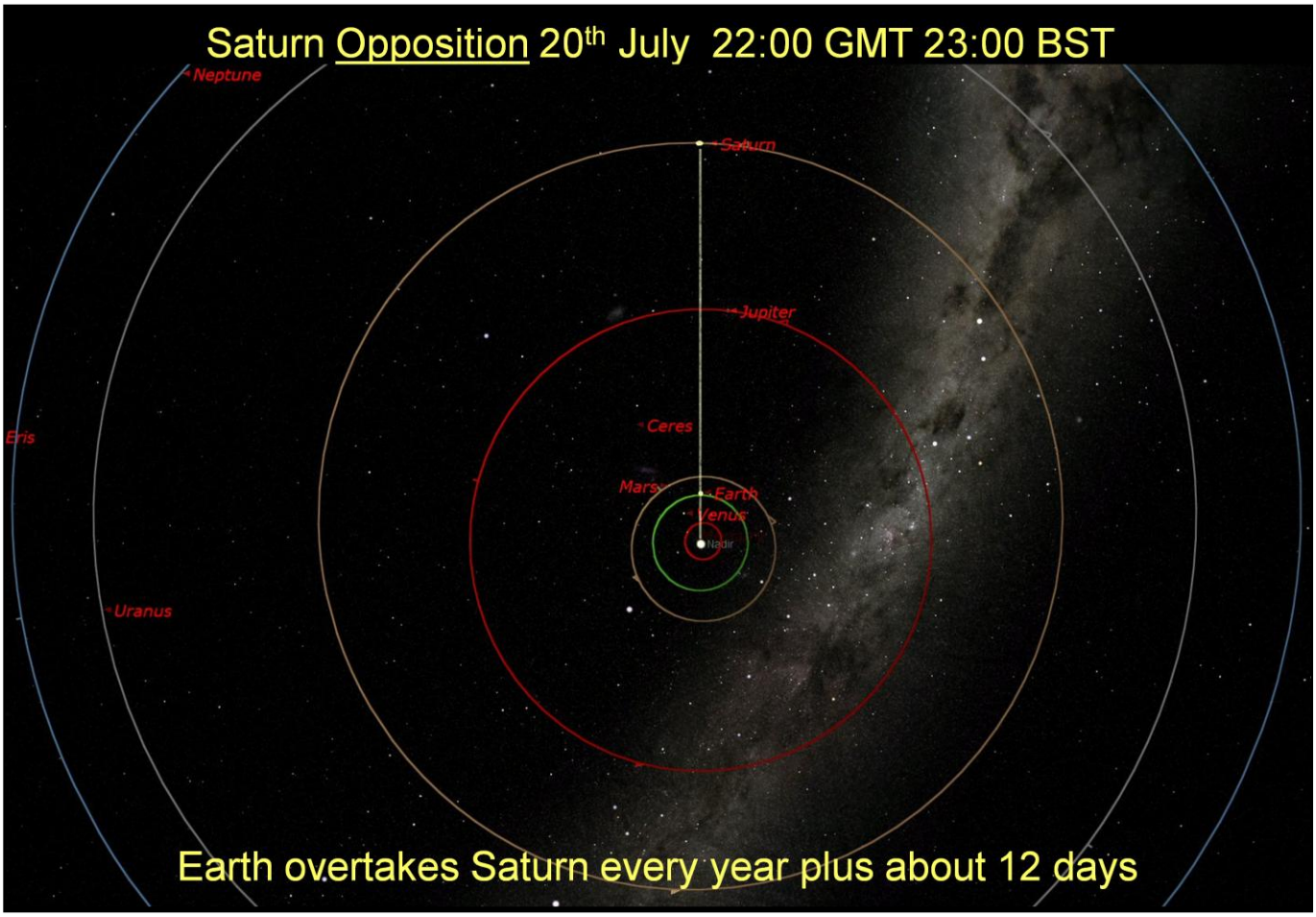
It does not matter too much that we have missed it because Jupiter will look the same on 13th and the 16th so we can take any opportunity to enjoy looking at it. The only thing that will have changed is the positions of the moons.



This picture was generated using the Starrynight planetarium application. It shows the approximate positions of Jupiter's moons after tonight's Beginners meeting.



This image was taken by the author under quite challenging conditions but it is pretty much as Jupiter appeared at the eyepiece that morning. It is not looking so good this year because it is positioned low in the south and is in the thick and turbulent air close to the horizon.

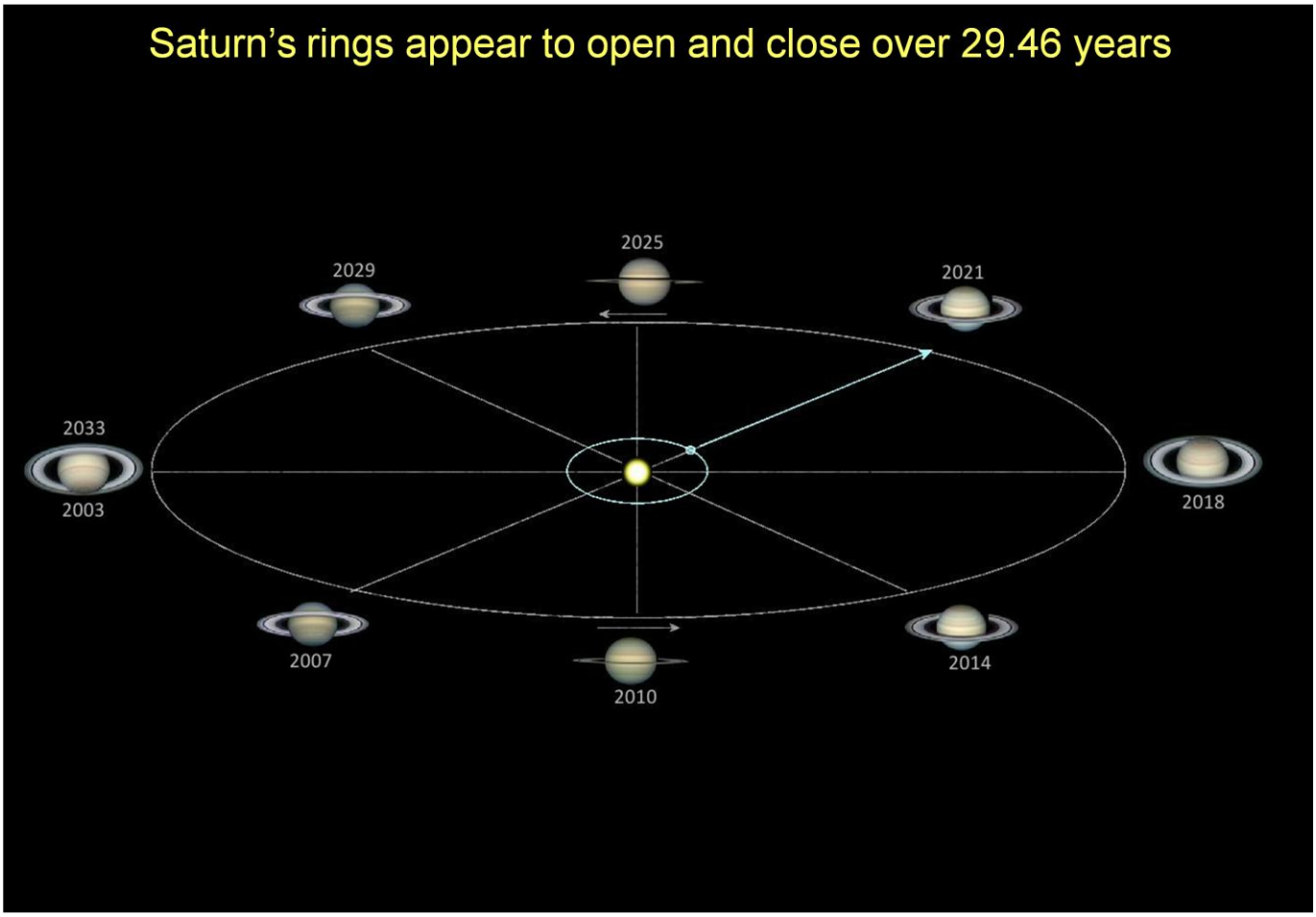


The opposition of Saturn occurs at 22:00 GMT (23:00 BST) on 20th July. This is the moment that Earth overtakes Saturn on its smaller orbit inside Saturn's orbit.

Earth catches up and under-takes Saturn every 372 Earth days (12 days later than the previous year).

Earth's orbit is 1 year (365.25 days) Saturn takes 29.46 years (approx 30 years) to orbit the Sun. So Earth's orbital time is approximately 1/30 of Saturn's so we can say approximately 360 days ÷ 30 = 12.

So Saturn will have moved approximately a further 12 days forward when Earth has completed one orbit. Therefore Earth will take another 12 days to catch up with Saturn again. This means Saturn's oppositions occur approximately every year plus 12 days (365 + 12 = 377 days) actually 377.65 days.

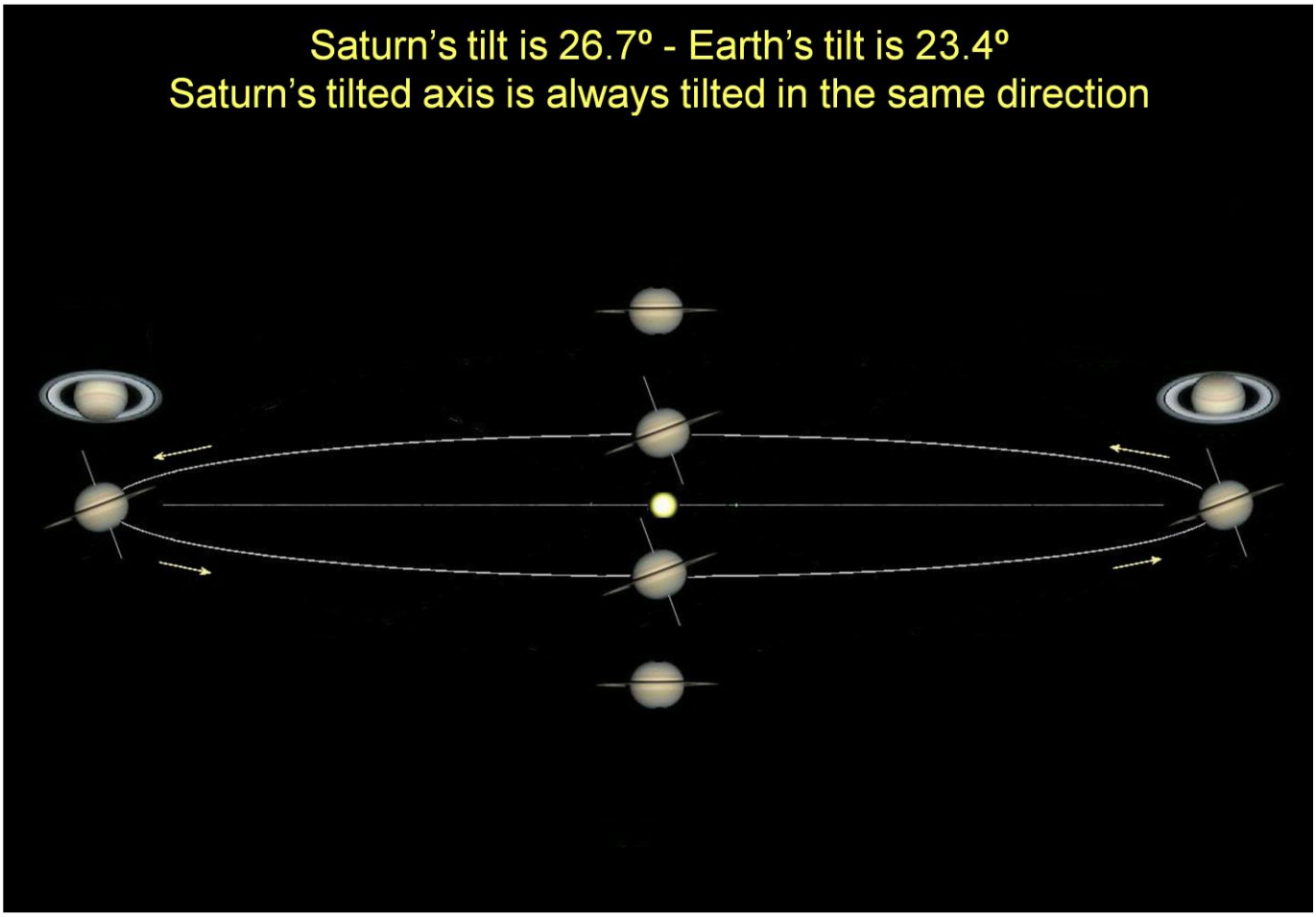


Our view of Saturn is very much governed by our proximity to the Sun so we see Saturn almost as if we were watching from the position of the Sun.

Saturn's axis of rotation (its day) is tilted similarly to the tilt of Earth. So Saturn is always tilted towards the same direction regardless of where it is on its orbit.

Consequently sometimes we see the ring system tipped towards us other times it may be tipped away from us and half way between we see the ring edge on and it virtually disappears for a week or so.

The diagram above shows how Saturn will appear during its current orbit from 2003 until 2033. So at the moment it appears similar to the top right view labelled 2021.



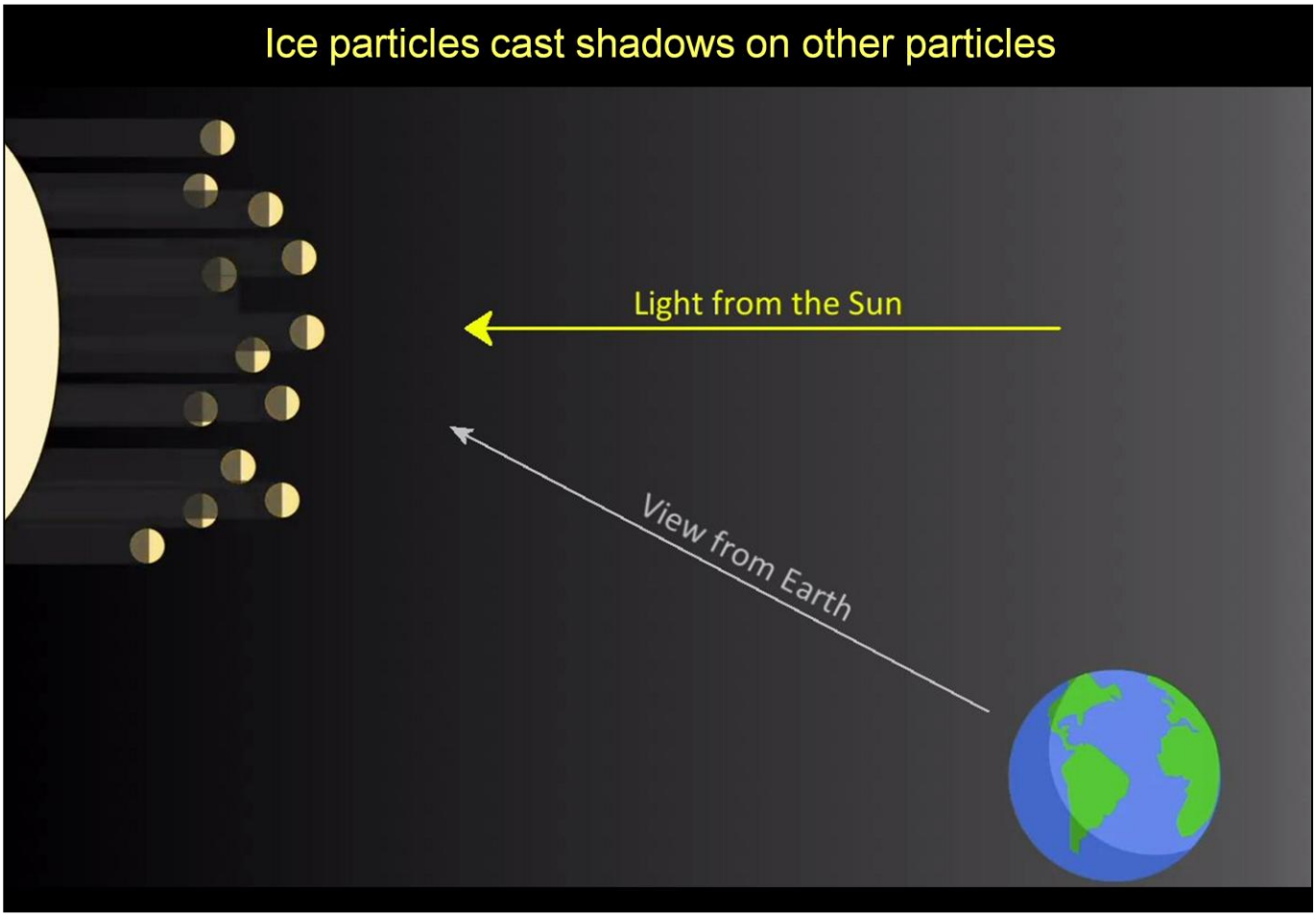
The diagram above shows how Saturn's axis of rotation is always tilted in the same direction . So Saturn is always tilted towards the same point in the sky regardless of where it is on its orbit.

The diagram shows how Saturn will appear during its current orbit from 2003 until 2033. The view on the left was the view we had in 2003 with the ring wide open and looking at the underside of the ring. The lower view was as we saw it in 2010 with the ring edge on. The view on the right was the view we had in 2018 with the ring wide open and we were looking at the top of the ring.

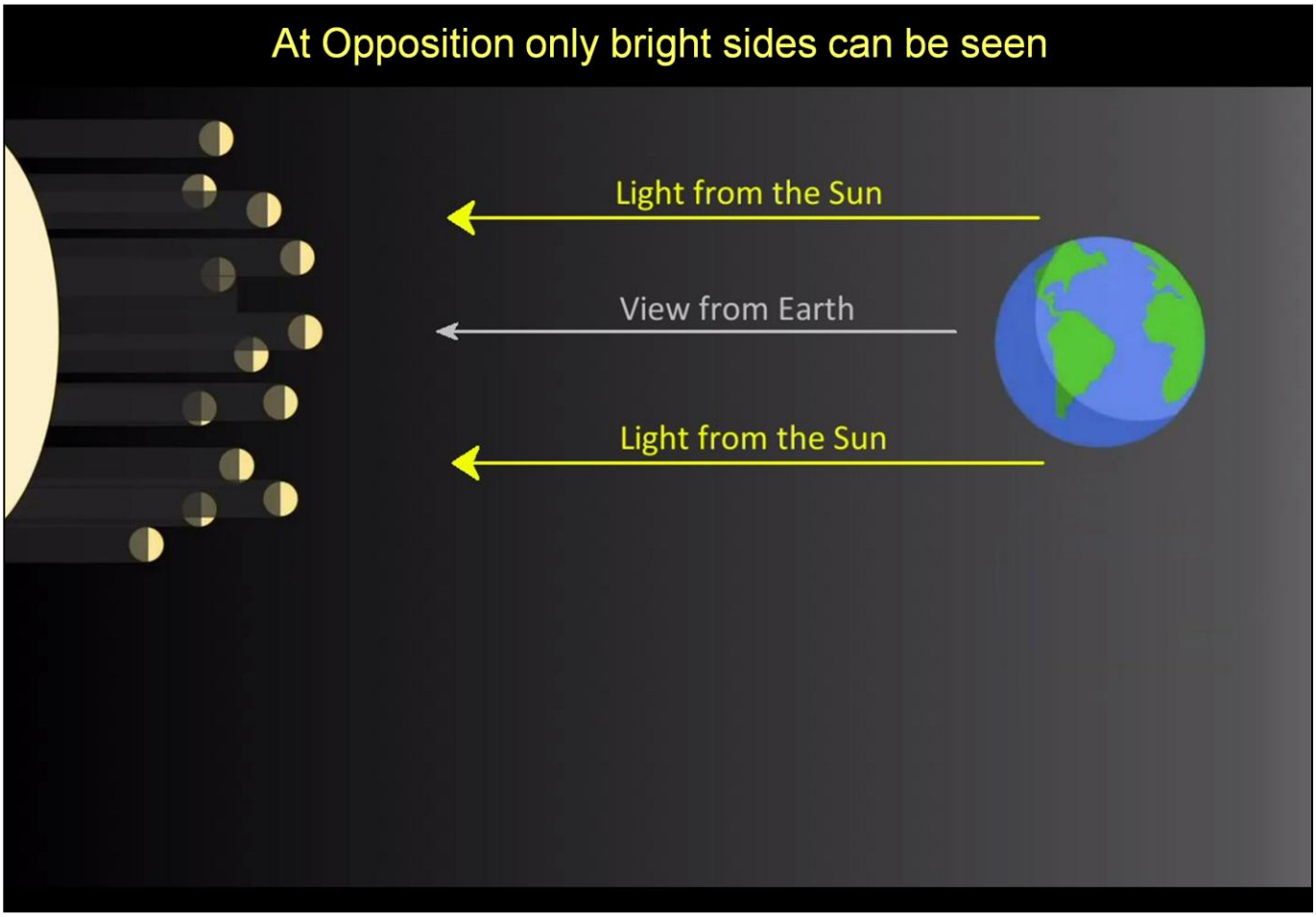
So at the moment in 2020 it appears about half way between the image on the right and the one in the top middle as shown on the previous diagram.

Hugo von Seeliger 1849 - 1924

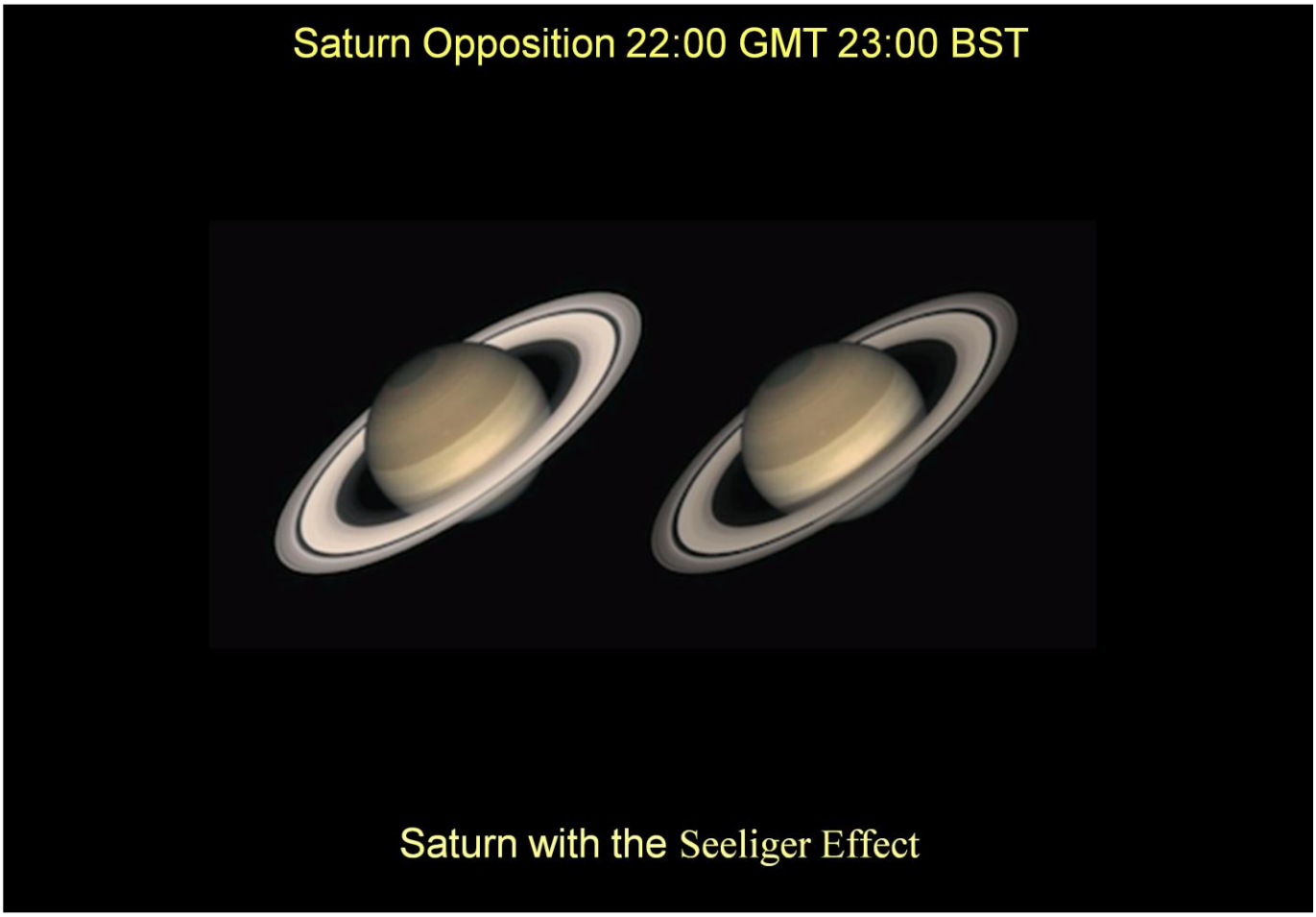
The famous German Astronomer Hugo von Seeliger.



When Earth and Saturn are not in opposition we view the ice particles of Saturn's ring system at an angle compared to the light rays coming from the Sun. Consequently we see some of the particles in shadows and this our normal view.



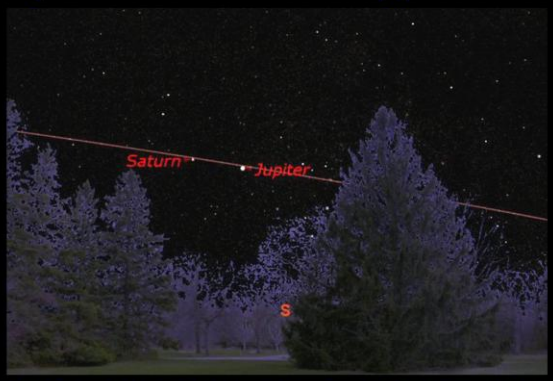
At opposition we are looking at Saturn along the same direction as the light from the Sun. At this position all the ice particles in our line of sight are completely illuminated and we see no shadows. So for a short time (about one hour) the ring system appears brighter.



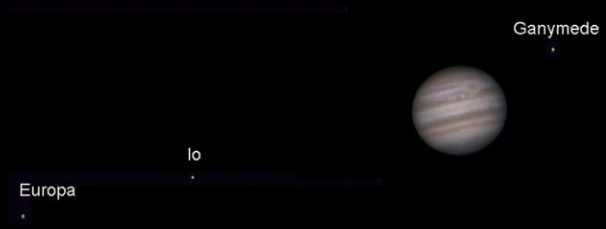
At the exact time of Opposition (for about one hour) the ring appears to noticeably brighten.

This is called the Seeliger Effect named after the famous German Astronomer Hugo von Seeliger.

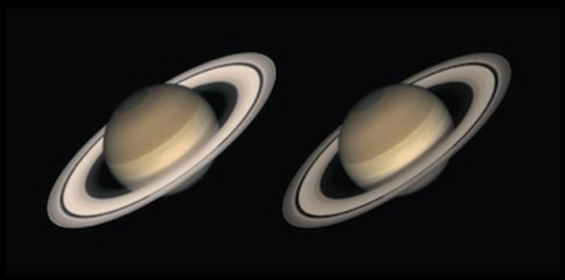
Jupiter and Saturn Oppositions



Conjunction of Jupiter and Saturn July



Jupiter on the night of 14th July



Saturn on the night of 20th July
11 o'clock the Seeliger Effect

So the three things to look out for this month are:
The CONJUNCTION of Jupiter and Saturn throughout July and the rest of the year.
The Opposition of Jupiter any time around 14th July.
The Opposition of Saturn at 23:00 BST on 20th July to watch for the Seeliger Effect.
And, of course Comet 2020 F2 (NEOWISE).

Have a look while you can it is all for real.