BAA Winchester Weekend 2019

Pete and Paul's Observing Challenges

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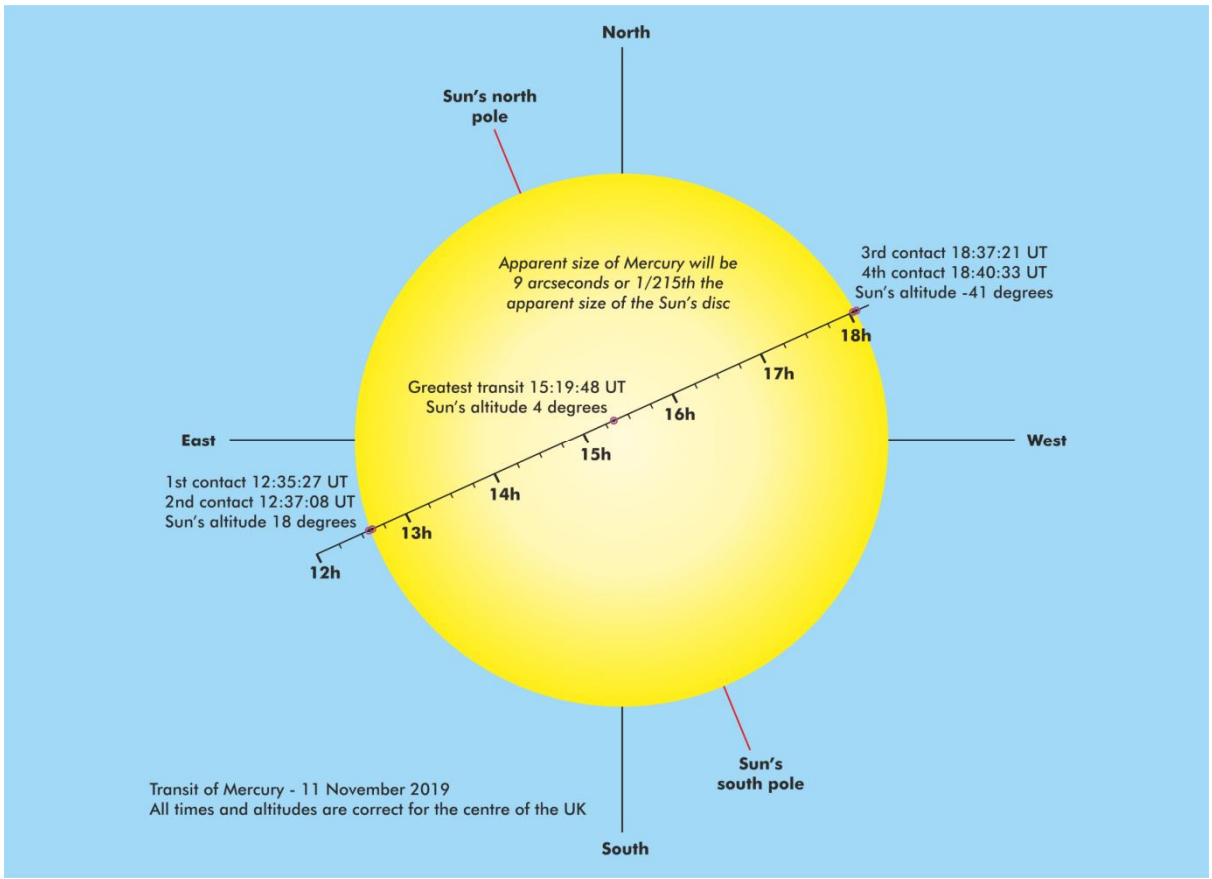
Challenge 1: Observing the Transit of Mercury

On 2019 November 11th the planet Mercury will pass in front of the sun. The first challenge is to observe the transit. The chart below gives the start and end time of the transit along with Mercury's path across the sun.

If you have a refractor under 150mm aperture you can project the Sun and observe the transit in white light. Alternatively certified solar film can be used to make any telescope safe for solar viewing by covering the entire front aperture – remember to cap or remove the finder! Another method is to observe with a hydrogen-alpha telescope directly. BE CAREFUL WHEN OBSERVING THE SUN! Never observe the Sun directly without a certified filter.

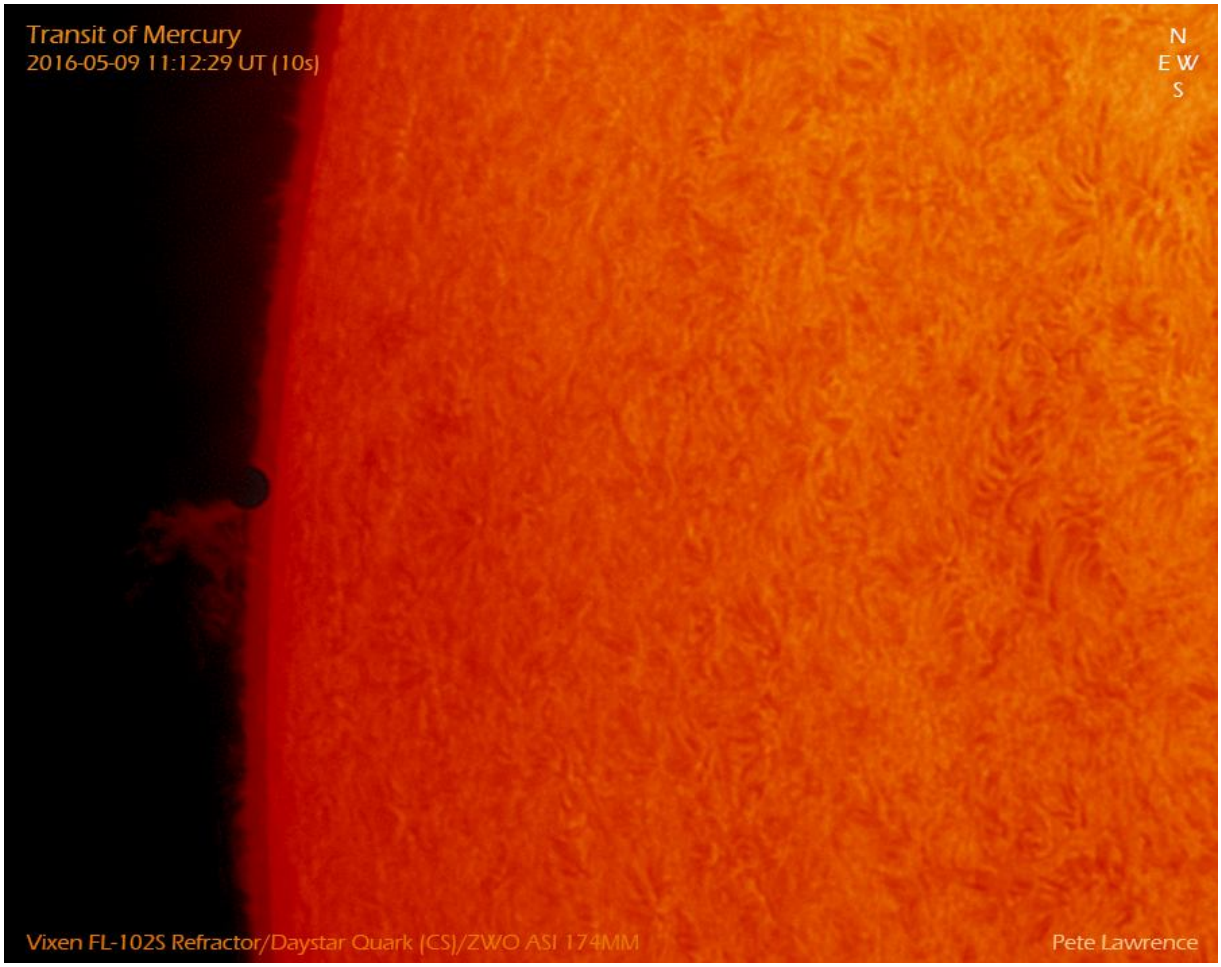
UK observers will be able to observe the start of the transit but the Sun will set before the transit concludes.



Challenge 2: Viewing Mercury Against the Spicule Layer at the Start of the Transit

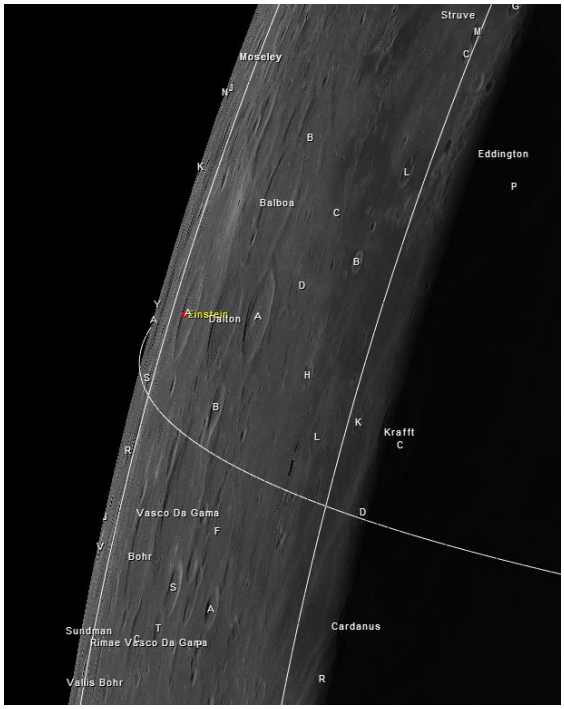
Just before the start of the transit, Mercury will pass against the spicule layer of the Sun. The spicule layer is a cross-section through the chromosphere as seen at the edge of the Sun via a hydrogen alpha filter. It is not visible in white light, only H-alpha, so you will need a solar telescope for this challenge.

In H-alpha, Mercury will appear as a black silhouette against the spicule layer (see image below). It's best to start observing from around 1215UT- make sure you know which side is east and west in your telescope! If you get the wrong side, you will miss the event and remember the sun sets from the UK by the time the transit ends.

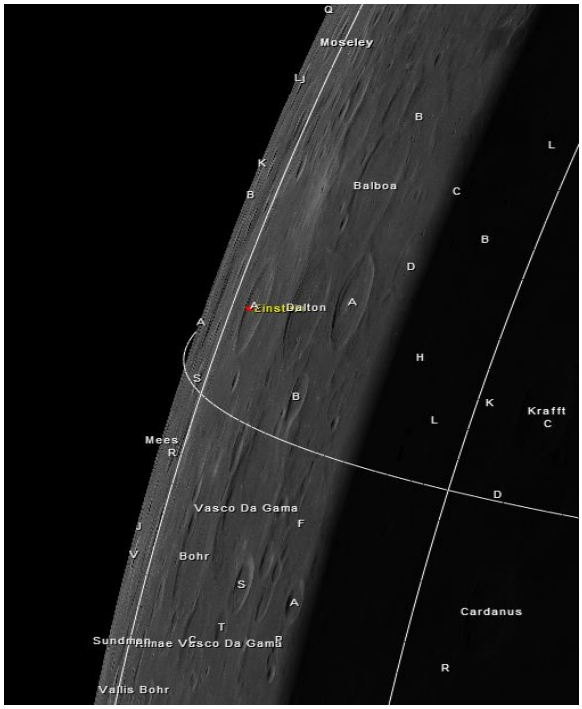


Challenge 3: Finding Einstein

The crater Einstein lies is a libration zone feature and only visible when the libration favours the Moon's western limb. The chart below gives its location and some favourable times. You can find other times using the free NASA 'dial a moon' programme available via https://svs.gsfc.nasa.gov/4442 or by using the Virtual Lunar Atlas which is available from https://www.ap-i.net/avl/en/start



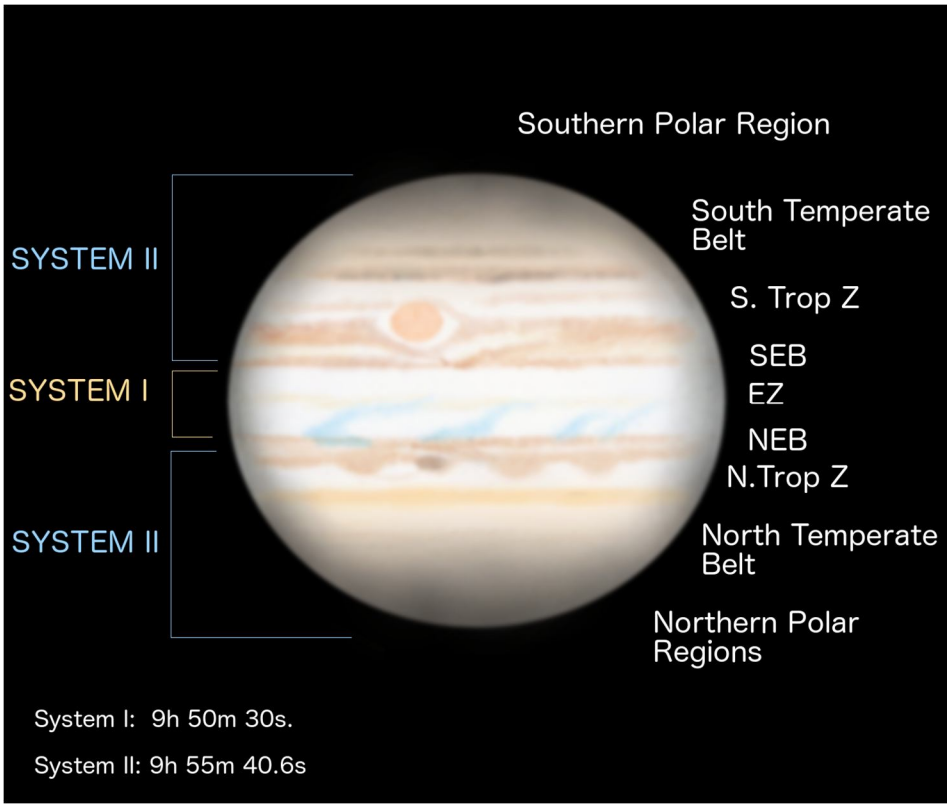
Early morning 3rd & 4th May 2019



Early morning 1st & 2nd June 2019.

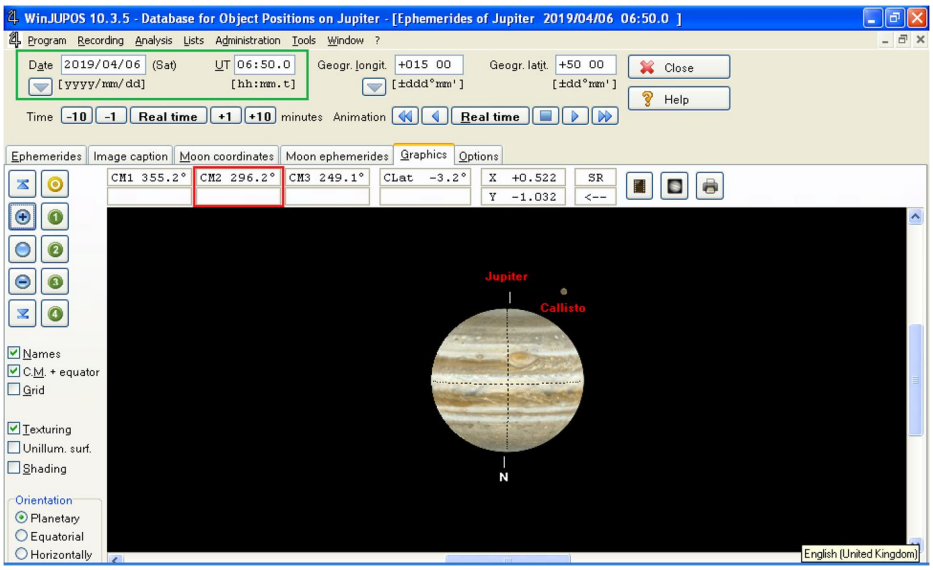
Challenge 4: Measuring the Size of the Great Red Spot

Jupiter's great red spot is a vast storm which sits in Jupiter's southern equatorial belt (see below). To measure the GRS you'll need the free software WINJUPOS. You'll also need at least a 4 inch telescope to see it. You can use a blue filter to help darken the spot and make it easier to see.

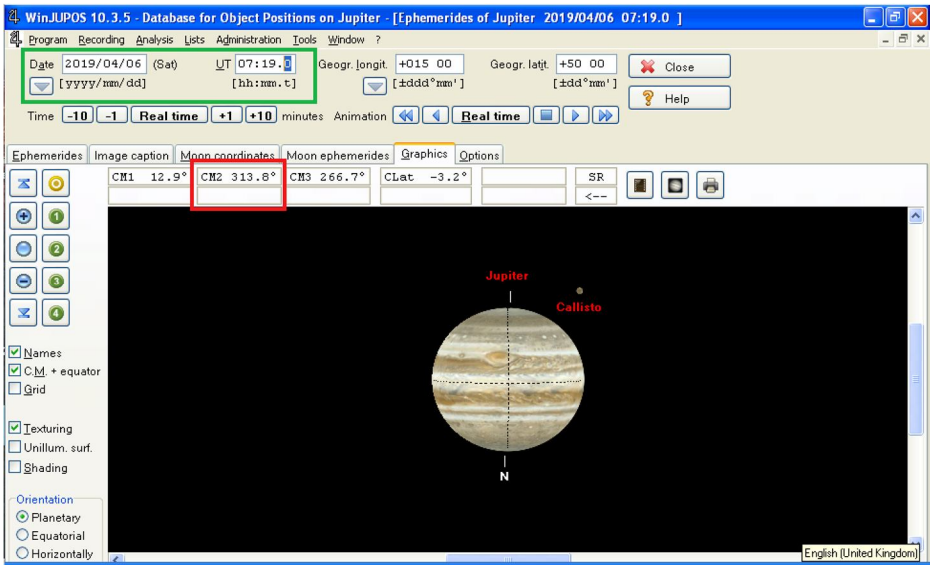


Check when the GRS is visible- the aim is to record the times (in UT) that the preceding edge and the following edge appear on Jupiter's central meridian (an imaginary line connecting the north and south poles).

When the preceding edge (see figure below) is on the CM, record the time in UT and put the date and time into the fields in the WINJUPOS programme, WINJUPOS will then give you the CM2 value:



You'll need to wait about 12 minutes or so for the other end of the spot to cross the CM- when this happens record the time and put this into WINJUPOS to get a CM2 value for the other edge:



We can now get the length of the spot in CM2 longitude by subtracting the two values:

$$Length\ (CM2) = 313.8° - 296.2° = 17.6°$$

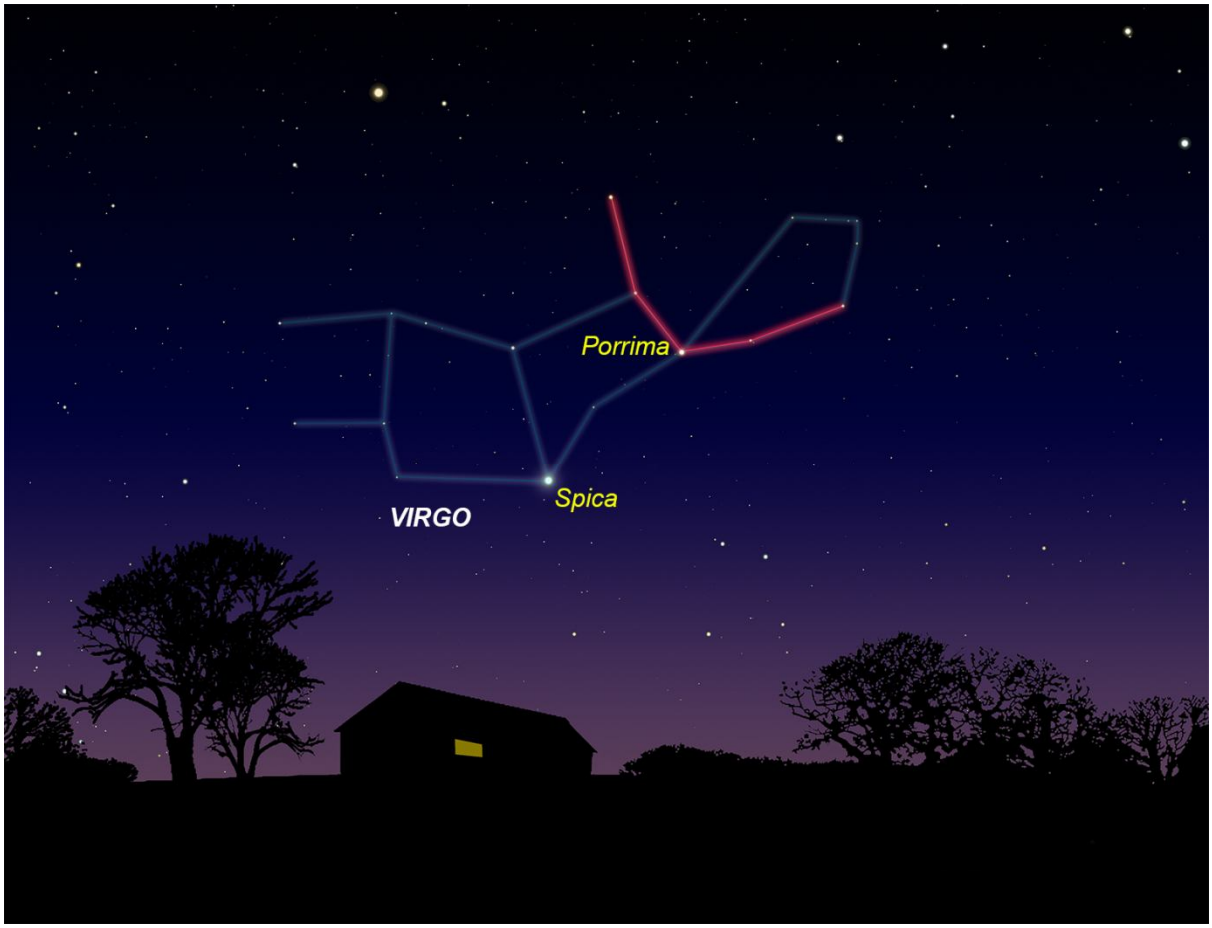
Finally, multiply this length by 1187 to convert CM2 longitude into kilometres:

$$Length(km) = 17.6 \times 1187 = 20891.2\ km$$

This is a bit too large (because we've used a WINJUPOS graphic rather than a real observation) but the principle is the same. If you do this a number of times, you can work out if the spot is shrinking or staying the same size.

Challenge 5: Splitting Porrima

Porrima (also known as Gamma Virginis) is a binary star in the constellation of Virgo. The orbital period is 168.93 years and only a few years ago the component stars appeared so close together that earth-based telescopes couldn't resolve them. As time passed they appeared to move apart and this year they have widened enough that most amateur scopes should resolve them. The challenge is to use your telescope to see both stars visually. You can find Porrima at the base of the Bowl of Virgo in the chart below:



Challenge 6: Magnitude Estimates of OJ 287 System

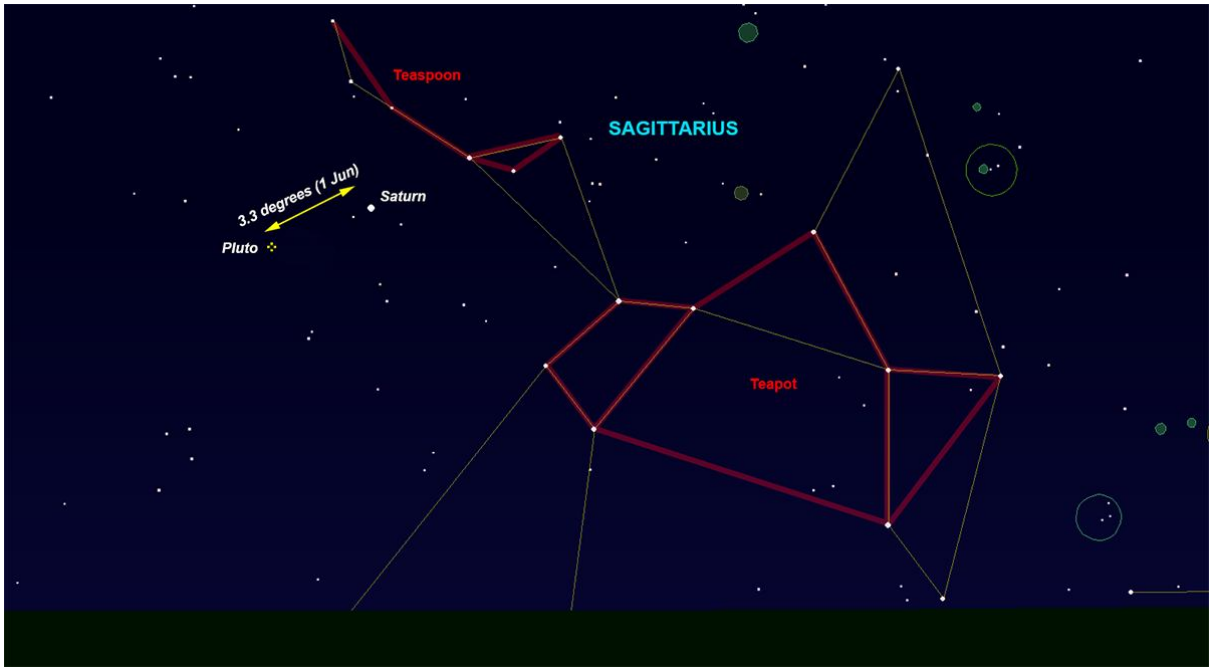
The system OJ 287 is a binary black hole system some 3.5 billion light years away in the constellation of Cancer the Crab. The primary black hole has a mass of some 18 billion solar masses, the secondary is *just* 150 million solar masses.

The primary is surrounded by an accretion disk and the secondary punches through this disk twice during its orbit. When this happens the disk becomes unstable and brightens up until it settles back and becomes stable again.

The BAA Variable Star Section require observations of this system- it is quite faint so you will need a large telescope (10 inches at least) to see it. To make magnitude estimates you will need the correct finder chart- contact Gary Poyner at the Variable Star Section and he will provide you with charts and any assistance you need in observing this remarkable object.

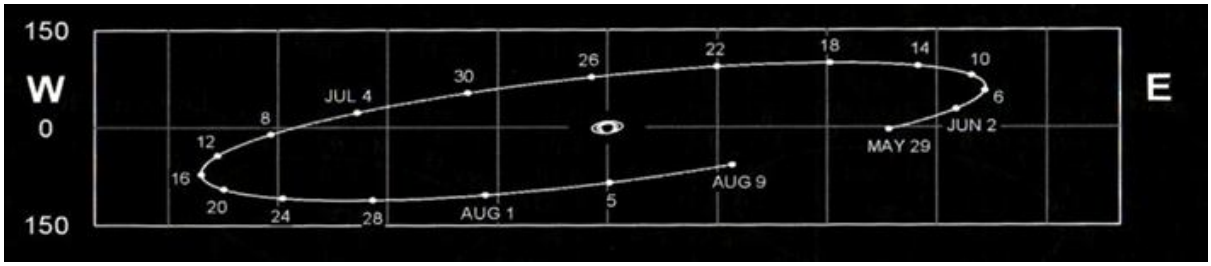
Challenge 7: Saturn vs Pluto

This challenge is to try and observe Saturn and Pluto at the same time. Saturn is an easy target and currently resides in Sagittarius. Pluto is also in Sagittarius and on 1st June 2019 the two planets are just 3.3° apart- can photograph them both in a single image?



Challenge 8: Observing the Variation of Iapetus

Iapetus is a 3rd largest moon of Saturn. It has an interesting two tone surface- one hemisphere is rather bright, the other is covered in a dark reddish material. As a result, Iapetus changes in magnitude considerably as it orbits Saturn. Iapetus is brightest when on the western side of Saturn and faintest when on the eastern side. A good time to do this challenge is early July when Saturn comes to opposition:



Other charts showing the position of Iapetus can be found in the BAA Handbook.

Challenge 9: The Moon and M44

On the 13th April 2019 the Moon will pass through the southern part of M44- the Beehive cluster in Cancer. During this time a number of stars will be occulted by the Moon. The challenge is to observe these occultations using binoculars or a small telescope- see the BAA website for more details.

Challenge 10: Photographing the Moon and M44

The final challenge is to try and image the Moon and M44 as the lunar disc passes south of the main part of the cluster (challenge 9)! This can be a little tricky as the Moon is obviously much brighter than M44!

If you have a go at any of the challenges and want to share them at Winchester in 2020, post them on the members section of the BAA website. You can always email them to paul.abel@yahoo.co.uk

Best of luck!

Pete & Paul.