

The Sun

I have an app on my phone which provides an up to date view of the position of the Sun on the Ecliptic. It also shows where the Ecliptic runs relative to the Tropic of Cancer, the Celestial Equator and the Tropic of Capricorn marking the positions that the Sun will reach on the Equinoxes and the Solstices. I have been watching the Sun creep along the Ecliptic and pass the Northern Solstice.

At the Northern Solstice on the 20th June the Ecliptic briefly touched the Tropic of Cancer before falling away to the south. However, for a week or two either side of the Solstice, the Ecliptic and the Tropic of Cancer run almost parallel to each other with the result that the length of the day does not vary much. At the end of July the Sun will rise about half an hour later and set half an hour earlier than it did at the beginning of the month.

The Moon

This month the Moon will be full on July 5th, will reach last quarter on July 13th, will be new on July 20th and will reach first quarter on July 27th.

The Planets

The giant planet *Jupiter* comes to opposition this month. It is at its closest point to us on 14th July when it will be some 384 million miles from us. Although it will be low in the southern sky, it will be the best opportunity this year to see details of its cloud belts and the movements of its larger moons. Best views will require a telescope but a pair of binoculars will show you the four Galilean moons Io, Europa, Ganymede and Callisto. I will now list some features for you to look for.

- Jupiter rotates rapidly, approximately one rotation every 10 hours. This causes the equator to bulge. Look carefully and you will see that the distance north to south is less than the distance east to west.
- Notice the cloud belts, a small telescope should show at least two. In one of the belts is the famous red spot. This is not as easy to see as modern images imply. Planetarium programmes such as Stellarium will show when and where the spot is visible. It is a good idea to know where the spot is located before looking for it.
- Spot and identify the four Galilean moons.

Notice how they move from night to night. Most of the time moons will be arranged on both sides of the planet but on the night of 8th/9th July at midnight BST all four planets are to be found to the planet's east and on the night of 10th/11th they all appear to the west.

Sometimes the moons will appear in front of the planet and sometimes they throw their shadow onto the face of Jupiter. In fact, it is easier to spot the dark shadow of a moon transiting the planet than spotting the moon itself. On the night of 15th/16th July a little after 3am BST Io and its shadow will begin to cross the disc. As Jupiter will be close to opposition Io's shadow will appear very close to Io itself.

The giant planet *Saturn* is closely following Jupiter round the sky and will reach opposition on July 20th when it will be 835 million miles from us. I will list a number of features to spot.

- The most obvious feature is the rings. They are reasonable wide open at the moment making an easy target with a small telescope.
- A small telescope will also show the Cassini division - a gap between the two main rings. These are sometimes difficult to see when the sky has poor visibility, for example when there is turbulence, and this may be particularly problematic given that Saturn, like Jupiter, will be low in the sky during this year's apparition.
- When the planet is at, or close to, opposition as it will be on July 20th you may notice a brightening of the rings. This is known as the Seeliger Effect and is thought to be due to the angle at which we view the particles. Shadows of the particles are hidden by the particles themselves.
- As Saturn moves away from opposition, the shadow of the planet falls onto the rings. Notice how the shadow increases in size as the planet moves further and further away from opposition.
- Saturn has a number of moons bright enough to be seen through amateur telescopes. The largest of these is Titan, the second largest moon in the solar system after Jupiter's Ganymede. See if you can spot it. Use a planetarium programme such as Stellarium to locate the position of the moon at the date and time you plan to make your observations. While you are about it see if you can locate any of Saturn's other moons .

Those of you who watched the narrowing of the crescent *Venus*, as it moved towards conjunction with the Sun in May, will be pleased to know that it has moved far enough away from the Sun to be visible in the morning sky before sunrise. At the beginning of the month it will be displaying a crescent which will get

thicker as the month progresses. If you want to see it as a narrow crescent you will need to get up early at the beginning of the month when sunrise will be a little before 5am BST.

Mars starts the month among the stars of Pisces near the border with Aquarius. It will be shining at magnitude -0.5 and will be moving north. By the end of the month it will still be among the stars of Pisces but its disc will have increased in size from 11.5 arc seconds at the beginning of the month to 14.5 arc seconds at the end. Its disc is becoming sufficiently large to reveal surface features in a moderate sized telescope. The south polar cap will be one of the more obvious features but this will be receding as the Martian spring progresses. Over the next few months Mars will draw closer to us. It will reach opposition in October when it will be 22.4 arc seconds in diameter and will be shining at magnitude -2.6.

I have concentrated on planets this month but must mention that one of my favourite asterisms, the Summer Triangle, is now prominent. The triangle is composed of Altair in Aquilla the Eagle. Vega in Lyra and Deneb in Cygnus the Swan. I like to time travel. When I look at Aquila I am looking back in time about 16 years to when the building known as the Gherkin joined the London skyline. When I look at Vega I am looking back about 25 years, the year that the first Toy Story film was released. When I look at Deneb I am looking back 14,00 years about the time when the Vikings started to raid Britain. Food for thought until next month!