

## The Winter Solstice

Here we are in December and the Sun, which has been moving steadily south ever since midsummer's day back in June, is approaching the winter solstice.

On 21<sup>st</sup> December, shortly after 10am, it will reach its furthest point south and will begin to come back north. The point at which the Sun changes direction is known as the winter solstice in the northern hemisphere and the summer solstice in the southern hemisphere. In the north we will celebrate the shortest day of the year.

From the latitude of London, the Sun will rise around 8am and will set around 4pm giving only around 8 hours with the Sun above the horizon. The Sun will remain low in the sky reaching an altitude of only  $14^{\circ}$  around mid-day. On the day of the solstice the Sun will be overhead along the Tropic of Capricorn. This has a latitude of  $-23.5^{\circ}$  which reflects the fact that the Earth's axis of rotation is inclined  $23.5^{\circ}$  to the plane of its orbit. In six months time the situation will be reversed with the Sun reaching  $+23.5^{\circ}$  lying over the Tropic of Cancer, giving the northern hemisphere its longest day.

## The Moon

In December the Moon will be at last quarter on the 8<sup>th</sup>, will be new on the 14<sup>th</sup>, will be at first quarter on the 21<sup>st</sup> and will be full on the 30<sup>th</sup>.

On December 21<sup>st</sup> the Moon passes in front of the star 30 Pisces. With the Moon at first quarter the leading edge will be in darkness and the magnitude +4.4 star will disappear at 7.53pm. It will reappear from the bright half at 9.05pm.

On 24<sup>th</sup> December at 7.34 pm the star 65 Ceti will disappear behind the Moon at the same moment as the star 64 Ceti reappears from behind the Moon. 65 Ceti will reappear at 8.53pm.

## The Planets

*Mercury* is too close to the Sun for viewing this month. It will be in conjunction with the Sun on December 20<sup>th</sup>.

*Venus* will present as a bright morning star throughout the month. It will draw closer to the Sun as the month progresses.

*Mars* shines from among the stars of Pisces. Its red colour and brightness make it an unmistakable feature in this part of the sky. It is still close enough to us for surface features to be discerned through a telescope. However, we are moving away from it, with the result that it will fade by about one magnitude during the month.

The big event of the month concerns *Jupiter and Saturn*. They are moving closer together ready for a very close conjunction on December 21<sup>st</sup>. At the time of the conjunction the pair will be close enough to be visible in the same field of view even with a 200mm telescope working at f/10. The pair are to be found in the west just after sunset. They are sufficiently close to the Sun and to the horizon, however, to make the window of opportunity for viewing frustratingly short. It is very important, therefore, that you do not point optical instruments in their direction until after the Sun has set. The risk of damaging your eyesight is too great.

*Uranus* is shining at magnitude +5.7 from among the stars of Aries. It is within range of a pair of binoculars. A small telescope will show a small greenish blue disc.

*Neptune* is to be found among the stars of Aquarius shining at magnitude +7.9. It is within range of a small telescope.

*The Geminids meteor shower* occurs around the 14<sup>th</sup> December. This shower has been described as being second only to the Perseids in terms of number of meteors seen but in recent years the Geminids may have taken the crown.

Most meteor showers are the result of the Earth crossing the orbit of a comet. The comet will drop material along its path in the form of dust and ice. When the Earth's atmosphere hits the cometary material, it compresses the air generating enough heat to become incandescent.

The Geminids are different in that the parent body is not a comet but is more like an asteroid. The asteroid has been named Phaethon who in mythology is the son of the sun god Helios. Phaethon is 3.6 miles across and completes one orbit of the Sun in 1.4 years. When it is at its closest to the Sun it is only 0.14 astronomical units from its searing heat. It is thought that the intense heat blasts rocky debris from its surface producing the material which, when it has spread round Phaethon's orbit, produces the annual meteor shower. The shower is well known for its relatively slow meteors some of which leave trails across the sky. I saw one a few years ago which left a long corkscrew trail. The particle producing the trail must have been spinning.

The radiant of the shower is near Castor in the constellation of Gemini – hence its name. Don't watch the radiant but 10 to 20° to the side of it. The peak of the shower occurs on the nights of 13/14<sup>th</sup> and 14/15<sup>th</sup>. This year there is no Moon to interfere with the spectacle. Under a cloudless clear sky as many as 60 to 70 meteors might be seen.

That is all for this month. Keep safe and healthy. Have as good a Christmas as circumstances allow.

Clear skies till the new year.