Athenaeum Astronomy Association

THE NIGHT SKY IN DECEMBER 2021

Welcome to the AAA Podcast for December.

The Sun & Day Length
The seasonable snowy weather heralds the coming of the Winter Solstice on December 21^{s}, the shortest day.

The Sun, which has been moving south since the Summer Solstice in June, will reach the extremity of its travel, stop, and begin to move back north.
On this day in London, the Sun will be above the horizon for only 7 hours and 50 minutes rising at 8.03 GMT and setting at 15.53 GMT.
During December the day length hardly changes.

At the beginning of the month the Sun will rise around 7.45 GMT and will set around 15.50 GMT, giving a day length of around 8 hours and 10 minutes.
At the end of the month the Sun will rise around 8.06 GMT and will set around 16.00 GMT giving a day length of around 7 hours 55 minutes.
There is only a difference of about a quarter of an hour between the day length at the start and finish of December, which is hardly noticeable.
Compare this to the day length change in September, the month of the Autumn Equinox, when the rate of change is much faster. There is nearly a 2-hour difference between the day length at the beginning and end of September and this rapid change of daylight acts as a powerful signal to hibernating animals to prepare to retire for the winter.

The Moon
The Moon will be new on the 4th of December. It will be at first quarter on the 11th and will be full on the 19th. It will reach last quarter on the 27th.

The Planets
All the planets, except Mars Uranus and Neptune, are low in altitude and are approaching evening twilight this month.

The most obvious is *Venus*. This shines brightly at magnitude -4.7 but remains around 10º to 12º of altitude just after sunset on the southwestern horizon.

Following Venus along the ecliptic is *Saturn*, to be found about 15º to the east of Venus with *Jupiter* a further 15º degrees to the east of Saturn. Both gas giants are easily found, but are in the murk of the horizon and, therefore, will not give good telescopic views.

During the last week of December, fast moving *Mercury* joins the group, shining at magnitude -0.8. It appears a little to the east of Venus. It climbs rapidly, passing Venus, which by now is on its way down.

Mars is a morning object having emerged from behind the Sun but is too close to the Sun's glare to view.

Uranus is well placed among the stars of Aries shining at magnitude +5.7. Following last month's opposition, it offers the best telescopic views.

Neptune shines at magnitude +7.8 from among the stars of Aquarius. It will be visible in the early to mid-evening but will be setting before 11pm by the end of the month.

Meteor Shower

The Geminids meteor shower will peak on the night of the 13/14th of December. It is one of the most spectacular showers of the year with a predicted rate of 60 to 70 meteors per hour.

The radiant, the point on the sky from which the meteors appear to be coming, is near the bright star Castor, one of the twins in the constellation of Gemini, from which the shower takes its name.

Comet 3200 Phaethon is the source of the particles for the shower. It is sometimes called a rock comet because the particles are hard giving rise to meteors with persistent trains.

Unfortunately, the Moon will be 78% illuminated, waxing gibbous, interfering with this year's shower. The glare from the moon will drown out some of the fainter meteors. However, it is due to set at 1.42 GMT so those of you keen enough to stay up will reap the benefit of a moonless sky. Sadly, I cannot promise a cloudless one!

Comets

There are several comets in the sky this month.

Comet 2021 Leonard will be visible in the morning sky at the beginning of the month. Between December 4th and 7th it will pass north of the star Arcturus in the constellation Bootes. It will pick up speed as it approaches the Sun and between the 11th and 13th it will cross the centre of the bell shape of the constellation Ophiuchus. After this it will be lost in the dawn sky.

It is difficult to predict how bright it will be, but some have suggested that it could reach naked eye visibility. I suspect, however, it will not be visible without some kind of optical aid.
The comet is classified as "long period" so will not return to the vicinity of the Sun for 80,000 years so, if you want to see it, it's now or never!

Comet 2019 L3 Atlas is approaching Earth and will be closest to us on January 6th, 2022. It is predicted to shine around magnitude +9. Between December 10th and 30th the comet will pass north of Castor, the brightest of the Gemini twins. On the night of 20/21st December it will be roughly in line with Castor and Pollux and slightly closer to Castor than Castor is to Pollux.

Comet Borrelly is climbing slowly northwards, heading for the constellation Cetus the Whale. It will be closest to us on December 11th but will still be further from us than we are from the Sun. It will be better placed for viewing at the end of December when it could be shining at magnitude +9.
Viewing opportunities will improve in January and February next year.

Near Earth Objects
Near Earth Objects, known as NEOs, are comets and asteroids which have orbits which bring them close to the orbit of Earth. Astronomers observe them closely, preparing ways to deflect them if they indicate the possibility of a future collision with earth.

An NEO - *Asteroid 4660 Nereus* - will pass us on December 11th, at a safe distance of 393 million kilometres (more than 10 times the distance of the moon).
On the morning of 11th at 4.00 GMT it will be around half a degree north of the star Dubhe, the brightest of the two pointers of the Plough asterism.
By 23.00 GMT it will have moved to near the middle of the bowl of the Plough, at Right Ascension 11 hours 42 minutes 59.3 seconds, Declination +59º 30 minutes 46 seconds. It should be shining at between magnitude +12.5 to +12.8 so will be in range of a medium aperture telescope.

I think that is enough for this month. Wishing you all well for Christmas and the New Year.