

Exploring the winter skies

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There are many things to see in the winter skies of December and we will touch on a few events in this article. Venus hangs in the southeastern early morning sky, 14 degrees off the horizon on Dec. 1 at 6 a.m. The planet stays at about the same place in the sky throughout the month. The Moon will pass Venus on Dec. 12, making a close approach to within a mere $\frac{3}{4}$ degrees of each other. From the Quad Cities, the pair will be visible in the dawn sky, rising at 5:16 a.m. and reaching an altitude of 15 degrees above the southeastern horizon before fading from view as dawn breaks around 7:01 a.m. The Moon and Venus will be a little too widely separated to fit comfortably within the field of view of a telescope but will be visible to the naked eye or through a pair of binoculars. You might be able to catch Mercury just barely peeking over the horizon at around 6:30 a.m., on the 1st, if you have an unobstructed southeastern horizon. Mercury will be below Venus and to the left. After the 1st, Mercury is lost in the Sun's glare.

High in the east-southeastern sky at sunset, on Dec. 1, you can still see Mars with its reddish tint. The fourth planet from the Sun, is not as bright as it was a couple of months ago as the much faster Earth is pulling away from Mars in its orbit. It still makes a spectacular site in the sky, however. In the southwest, you can see a bright Jupiter and a much dimmer Saturn, only about 1 $\frac{1}{2}$ degrees apart, getting ready for their big show later in the month. Saturn is much dimmer than Jupiter because it is twice as far away.

The great event to end the year 2020 is the great conjunction of Jupiter and Saturn on Dec. 21. A conjunction in Astronomy terms is when two objects in the sky are aligned remarkably close together. This may be between 1 to 5 degrees. The rarity of great conjunctions is due to the slow motion of Jupiter and Saturn across the sky plus an aligning up of their orbits so they can be incredibly close with spacing of 1/10 of a degree as in the case on

Quad-Cities Skywatch

Dec. 21. That is just 1/5 of a full Moon diameter apart! If you start looking at the pair at the beginning of the month, you can see Jupiter slowly closing in on Saturn until they are incredibly close in the sky on Dec. 21. Among the planets that are visible to the naked eye, they are the two most distant from the Sun, taking 11.86 years and 29.5 years respectively to orbit it. As the two planets gradually move through the constellations at different speeds, they follow almost the same path across the sky, called the ecliptic. Periodically, Jupiter catches up with Saturn and overtakes it, resulting in a conjunction, on average once every 19.6 years. The 2020 great conjunction will be the closest approach of the two planets since 1623, and they will not come so close again until 2080. A good set of eyes will be able to see a very bright Jupiter and a much dimmer Saturn, which will appear to look like it is winking because it is much fainter. In binoculars, which is the best to view the event from, you will be able to see Jupiter and its four Galilean moons very near Saturn. In a telescope with an eyepiece, you will be able to view Jupiter, the Galilean moons, Saturn and its bright moon, Titan. Since the pair will be very low in the early evening sky, from the Quad Cities and will be well on their way to setting, the best time to see the pair will be soon after sunset on the night of Dec. 21. The pair will become visible around 4:55 p.m. as twilight fades, 17 degrees above your southwestern horizon. The pair sets at 6:56 p.m.

The winter solstice (or beginning of astronomical winter) begins at 4:02 a.m. in the morning of Dec. 21st. It occurs when one of the Earth's poles has its maximum tilt (23 $\frac{1}{2}$ degrees) away from the Sun giving the northern hemisphere the longest night and the shortest amount of daylight for 2020. Since prehistory, the winter solstice has been a significant time of year in many cultures and has been marked by festivals

and rituals. This is also the day when the Sun's annual journey through the constellations of the zodiac reaches its most southerly point in the sky in the constellation of Capricorn and begins summer in the southern hemisphere as the Sun is above the horizon for longer than on any other day of the year.

This month also marks the annual Geminid meteor shower which runs from Dec 4 to Dec. 17 and peaks on Dec. 13. The meteors appear to stream from a radiant point in the constellation Gemini. At about 5:30 p.m., from the Quad Cities, the radiant point of the Geminids begins to rise in the northeast until it reaches a peak altitude of 81 degrees at 2 a.m. the next morning. The radiant point, then will be almost directly overhead. Through the evening, as the Earth rotates, the planet steadily turns until it is pointed directly into the meteor stream. The number of visible meteors increases the higher the radiant point is in the sky. Earlier meteors in the evening will have longer trails while meteors at the peak (2 a.m.) will have much shorter ones because you are seeing them come at you head on. At its peak, the shower is expected to produce a nominal rate of around 120 meteors per hour (Zenithal Hourly Rate). However, this ZHR is calculated assuming a perfectly dark sky and that the radiant of the shower is situated directly overhead. In practice, any real observing sight will fall short of these ideal conditions. The shower will peak close to new moon, and so moonlight will present minimal interference. So, try and get out and see a spectacular shower of light coming down from the heavens!

Terry L Dufek is a member of the Popular Astronomy Club which meets on the 2nd Monday of each month (currently through zoom). The club also has night-time public observing sessions every 3rd Saturday of the month, March through November, at Niabi Zoo in Coal Valley, Illinois. These dates may be cancelled based on current conditions so check our website or our home on Facebook.