

Sky Highlights for 2021

Courtesy of Sky & Telescope



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A full year of observing enjoyment awaits.

For our January Celestial Calendar installment, we've decided to present a "sneak-peek" selection of some of the most interesting celestial highlights for 2021. (Each event will be described in greater detail in upcoming issues.)

The coming year has its share of excitement, with several fine eclipses, the return of a few modestly bright periodic comets, and the usual assortment of meteor showers and eye-catching conjunctions.

January 3: The **Quadrantid meteor shower** peaks around 6:30 a.m. PST (14:30 UT). The timing of the peak means the display favors skywatchers on the West Coast and in Alaska. Unfortunately, light from the waning gibbous Moon in Leo will blot out many of the fainter meteors.

March 4: **Vesta**, the brightest and second-most massive asteroid, reaches opposition $1\frac{1}{4}^\circ$ northeast of 3.3-magnitude Theta Leonis, in the tail of Leo. At magnitude 6.0, Vesta is bright enough to be glimpsed by keen-eyed observers without optical aid from a dark sky. Binoculars will make the asteroid an easy catch.

The limb of the eclipsed Moon pokes out from the umbra in this photo captured during the April 15, 2014, total lunar eclipse. This view is similar to how the Moon will appear at maximum eclipse during November's partial lunar eclipse.

March 5: **Mercury** and **Jupiter** are just 21' apart, low in the east-southeast at dawn. On this date, Jupiter will shine at magnitude -2.0 , and Mercury at magnitude $+0.1$.

March 10: A thin, waning crescent **Moon** joins the planetary trio of **Mercury**, **Jupiter**, and **Saturn** in morning twilight. The group will span about 14° .

April 2: Jupiter's innermost moon, **Io**, passes just $0.5''$ south of the 5.9-magnitude star **44 Capricorni** around 5:20 a.m. CDT. The event occurs with Jupiter low in the southeastern sky and favors observers in the middle of North America. (From locations in Central America and northern regions of South America, Io occults the star.)

April 25: **Mercury** (magnitude -1.6) and **Venus** (-3.9) are a little more than 1° apart very low in the western sky during evening twilight.

April 26: **A perigean full Moon** (popularly called a "supermoon"), occurs tonight. The Moon is full at 11:31 p.m. EDT (3:31 UT, April 27th) and reaches *perigee* (when it's closest to Earth) a little less than 12 hours later, at a distance of 357,377 km (222,063 miles).

May 12: **Venus** and a very thin crescent **Moon** are only 1° apart, low in the west-northwest at dusk.

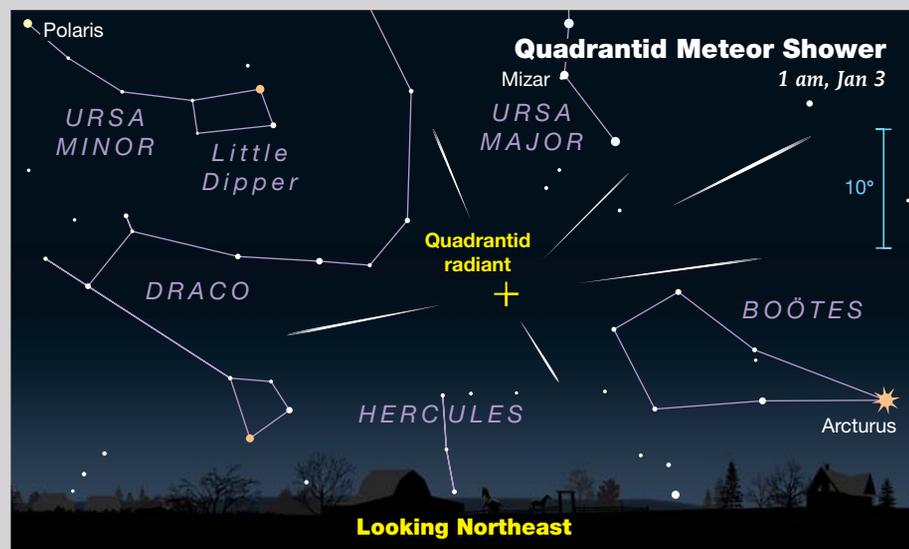
May 26: A **total lunar eclipse** is visible from western North America,

though many other locations will be able to see at least part of the event. Because the Moon's northern limb is barely inside the Earth's umbra, totality will be relatively bright and brief, lasting from 4:11 a.m. to 4:26 a.m. PDT (11:11 to 11:26 UT). As it happens, this night also presents another "supermoon." The Moon is full (at 11:15 UT) a little more than 9 hours after reaching perigee, 357,310 km from Earth.

June 10: An **annular solar eclipse** is visible in Canada, Greenland, and Russia. The path of annularity crosses mostly remote locations (including the North Pole) except at its southern end along the north shore of Lake Superior, where maximum eclipse occurs at sunrise. Early risers in the northeastern U.S. will see a dramatic sunrise with roughly 80% of the Sun covered by the Moon. Greatest eclipse (lasting 3 minutes 51 seconds) occurs at 10:42 UT.

June 23: Observers across North America can see **Mars** (magnitude 1.8) smack-dab in the middle of the **Beehive Cluster (M44)** in Cancer, low in the northwestern sky at dusk. Use binoculars or a small, wide-field telescope to view this conjunction.

June 25: Skywatchers in the western half of North America can watch the nearly full **Moon** occult the 2nd-magnitude star **Nunki** (Sigma Sagittarii), in



▲ January 2021's Quadrantid meteor shower will be hampered somewhat by light from a waning gibbous Moon, which rises in the early evening on January 2nd. Given the timing of the display's peak, the best time to look will be in the predawn hours of January 3rd.



2021 Returning Comets

Comet 7P/Pons-Winnecke makes a favorable return in 2021 and may reach magnitude 10 in the morning sky as it shuttles from Aquarius to Piscis Austrinus during mid- to late June. Comet-watchers expect this to be its best apparition in several decades. You can begin searching for the comet in northern Ophiuchus as early as April.

Comet 6P/d'Arrest has a moderately favorable return in 2021 and could brighten to magnitude 9 at its peak in late August and September as it travels from southern Ophiuchus into Sagittarius.

Comet 67P/Churyumov-Gerasimenko returns to the inner solar system. This year's apparition is similar to the one it had in 1982, when the comet reached 9th magnitude and grew a pretty tail. On the night of perihelion (November 2nd) it's well placed for viewing, positioned 3° southwest of Pollux, in Gemini. Back in 1982, watching the comet evolve inspired me to track every future comet within my telescope's reach.

▲ Comets as spectacular as last summer's NEOWISE (C/2020 F3) are the exception rather than the rule. The much more common fainter comets require telescopes to see — including the trio of periodic comets highlighted above.



Shortly after Jupiter occults 44 Capricorni on April 2nd, the star passes just 0.5" north of the Jovian moon Io, as seen in this simulation.

from the Americas, northern Europe, east Asia, Australia, and the Pacific. A full 97.4% of the Moon will dip into Earth's umbral shadow. The remaining 2.6% of the southern limb will glow brightly, giving the Moon the appearance of Mars with a polar cap. First umbral contact is at 2:19 a.m. EST (7:19 UT); greatest eclipse is at 4:03 a.m.; and the Moon exits the umbra at 5:47 a.m.

November 27: Ceres is at opposition and shines at magnitude 7.0 in Taurus. The asteroid spends November crossing the Hyades and on the night of November 4-5 passes just a few arcminutes south of Aldebaran.

December 5: Jupiter, Saturn, Venus, and the Moon form a spectacular 50°-long line in the western sky in twilight. Over the following three evenings, the Moon will visit each planet in turn. Towards the end of December, Mercury joins the gathering.

December 14: The Geminid meteor shower peaks around 2 a.m. EST (7 UT), which is nearly ideal for North American viewers. Unfortunately, the waxing gibbous Moon (80% illuminated) will spoil the show until it sets at around 3 a.m. local time. For a few hours before morning twilight, there should be some excellent, moonfree meteor watching.

the early morning hours.

July 11: The thin, waning crescent **Moon** shines 5° right of **Venus** and **Mars**, which are separated by 1° low in the western sky at dusk. On the 12th, Venus and Mars are a scant ½° apart and shine at magnitudes of -3.9 and 1.8, respectively.

August 2: Saturn is at opposition.

August 12: The **Perseid meteor shower** peaks in the predawn hours. The waxing crescent Moon won't spoil the view because it sets around 10 p.m. local daylight time on the 11th. There might be a few extra meteors visible, courtesy of Comet Chacornac (C/1852 K1). On August 12th around 4:22 UT, the Earth will pass very close (15,000 km) to the comet's dust tail. The radiant for the resulting meteors lies in southeastern Cetus near the star Pi Ceti.

August 18: The variable star **Mira** (Omicron Ceti) will be at or near its maximum brightness of magnitude 3.

August 19: The waxing gibbous **Moon** occults **Nunki** (Sigma Sagittarii) for observers in the southernmost U.S., Central America, and northern South America.

August 19: Jupiter is at opposition.

August 22: This morning features a **Seasonal Blue Moon**, that is,

the third full Moon in a season that contains four. This is the original (and largely forgotten) definition of the Blue Moon as outlined in the *Maine Farmers' Almanac*.

September 14: Neptune is at opposition.

November 4: Uranus is at opposition.

November 19: A near-total **lunar eclipse** occurs this morning, visible