SkyNews Astronomical events for Indian observers

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Sun, Planets and Transitions

The **Sun** will be in Pisces, the Fishes (*Meena*) on 1 April. Its angular diameter will be 32’01". The Sun moves to Aries, the Ram (*Mesha*), on 18 April. On 30 April, the Sun's angular diameter decreases by 16 seconds of arc to 31’45".

Mercury remains in Pisces this month. The planet is stationary on 2 April at about 4 am. It then goes into retrograde motion (travelling east to west on the celestial sphere) until 25 April, when it will be stationary again at about 6 pm. It is in inferior conjunction, right between the Earth and the Sun, on 12 April.

Venus moves from Aquarius, the Water-bearer (*Kumbha*), to Pisces on 1 April. Then it is in Cetus, the Whale (*Timingila*), between 11 and 13 April. It then crosses over back into the boundary of Pisces. Venus pairs up with **Neptune** on 3 April. The pair will be quite close to the eastern horizon, but it is worth attempting to spot both planets through a 150 mm telescope.

Mercury and Venus pair up on 19 April. This pair too will require considerable effort to be able to observe.

Mars is in Aquarius on 1 April and moves to Pisces on 18 April. On 11 April, Mars pairs up with **Saturn**, which will be interesting to watch and photograph. On 29 April, Mars passes less than 2’ (2 minutes of arc) from Neptune.

Jupiter moves from Aries to Taurus, the Bull (*Vrushabha*) on 28 April. Saturn remains in Aquarius.

(Disclaimer: we categorically mention here that we do not believe in astrology and believe that the only influence a planet has on us is to give us the viewing pleasure of its beauty. The sole purpose of giving the transition of planets and the Sun is to acquaint the reader with the Indian nomenclature of planets and constellations and also to show that the actual positions of the Sun and planets, which are based on

List of Events in April 2024

Dt	Dy	Time	Event
01	Mo	14:28	Moon south declination: 28.6° S
02	Tu	01:45	Mercury stationary
02	Tu	08:45	Last Quarter
03	Tu	18:38	Venus 0.3° S of Neptune
06	Sa	09:21	Moon-Mars: 2° N
06	Sa	14:50	Moon-Saturn: 1.2° N
07	Su	22:09	Moon-Venus: 0.4° S, occultation
07	Su	23:23	Moon perigee: 358800 km
08	Mo	17:50	Moon Ascending Node
08	Mo	23:48	Total solar eclipse
08	Mo	23:51	New Moon
11	Th	03:21	Uranus 3.4° S of Moon
11	Th	00:16	Mars-Saturn: 0.4° N
11	Th	02:38	Moon-Jupiter: 4° S
11	Th	18:08	Moon-Pleiades: 0.4° N
12	Fr	04:23	Mercury inferior conjunction
14	Su	04:06	Moon north declination: 28.6° N
15	Mo	19:17	Moon-Pollux: 1.6° N
16	Tu	00:43	First Quarter
16	Tu	20:15	Moon-Beehive: 3.8° S
18	Th	20:26	Regulus 3.3° S of Moon
19	Fr	18:20	Mercury 1.7° N of Venus
20	Sa	07:39	Moon apogee: 405600 km
21	Su	05:38	Jupiter 0.5° S of Uranus
22	Mo	12:14	Lyrid shower: ZHR = 20
22	Mo	16:15	Moon descending node
23	Tu	07:32	Moon-Spica: 1.6° S
24	We	05:19	Full Moon
24	We	14:15	Mercury stationary
27	Sa	01:30	Moon-Antares: 0.3° S
28	Su	19:58	Moon south declination: 28.5° S
29	Mo	10:02	Mars-Neptune 02' N

modern computing, are very different from those given in astrology tables.)

March of the Moon

On 1 April, the Moon will be at the spout of the‘teapot' asterism of Sagittarius. The next day on 2 April it will be inside the teapot.

New Moon is on 8 April, close to midnight. A total solar eclipse will be visible from the USA and other regions in North America. The next day, 9 April, the Moon will set about an hour after sunset. 10 April offers us a chance to see Uranus, Jupiter, comet 12P/Pons-Brooks, and a thin lunar crescent, all within less than a 7° area of the sky. The comet will be less than 2° south of the Moon.

On 11 April, the Moon will be right below the Pleiades cluster (*Kruttika*), and will occult a few stars in the cluster. On 15 April it will be inside the Gateway of Heaven, 1.6° south of Pollux. The nearly 75% illuminated Moon will pass south of Regulus (*Magha*). On 22 April, the nearly 98% illuminated Moon will be seen above and to the right of Spica (*Chitra*). From 26 April to the end of the Month, the Moon passes through Scorpio (*Vrushchika*), the Milky Way (*Akash Ganga*) and finally through Sagittarius (*Dhanu*).

Meteor Shower

The **Lyrid meteor shower** will be active from April 15 to 29. It is one of the regular meteor showers. This year the Lyrid meteor shower is expected to peak on 22 April at about 2.30 pm IST. The radiant will rise around local midnight and it will be close to the meridian by dawn.

Normally one can see about 10–15 Lyrids per hour, but there are known to be surges when the rate can increase to up to 100 meteors per hour.

The Greatest Show

April 2023 will be a treat for many sky watchers, with a solar eclipse on the cards.

Solar eclipse on 8 April 2024: There will be a total solar eclipse on 8 April. This eclipse will be visible over parts of North America, Mexico and Canada. Observers in these regions will be in for a spectacular treat. The next such event over this region will be in 2044.

At this time of year, the Moon's distance from the Earth allows its shadow to cover a broader region, stretching to almost 196 km. It is for this reason that the longest duration of totality will be a whopping four minutes and 28 seconds, over Torreón, Mexico. The eclipse will pass over densely populated regions and some important cities. Those outside the path of totality will be able to witness a partial solar eclipse. This includes 99% of the people living across the US, including parts of Hawaii and Alaska. Unfortunately the eclipse will not be visible over India, but those outside the eclipse zone may join in the festivity by watching NASA's live feed on https://science.nasa.gov.eclipses/future-eclipses/eclipse-2024.

The eclipse will begin over the South Pacific Ocean. The first populated region to witness it will be Mazatlan on Mexico's Pacific Coast, around 11:07 hours PDT (23.37 hours IST). Following this, the shadow will follow a north-eastern trajectory and travel through Texas, Missouri, Indiana, Ohio, Pennsylvania, New Yorkand Maine. It will enter Canada in Southern Ontario, and continue through Quebec, New Brunswick, and Cape Breton. It will exit the North American continent at Newfoundland, on the Atlantic coast.

Things to watch during a total solar eclipse:

Contacts: **First contact** is the moment when the leading edge, the eastern limb, of the Moon just touches the western limb of the Sun. **Second contact** is the instant when the Moon's eastern limb touches the inner eastern limb of the Sun. This is when totality begins. **Third contact** occurs when the Moon’s

western limb touches the Sun's western limb on the inside, and marks the end of totality. The time difference between second and third contact is the duration of totality. **Fourth contact** is when the Moon completely egresses the Sun's disc. At this time the moon's western limb touches the eastern limb of the Sun.

Atmospheric changes: After first contact, the Moon progressively covers more and more of the Sun's disc. The temperature will begin to drop, imperceptibly at first, and markedly later on. Wind speed will rise. The sky will get darker as the eclipse progresses. Planet Venus may become visible a few minutes before totality. Seasoned observers have observed some bright stars and planets in the sky during totality.

Shadow bands: As we approach totality and the visible surface of the Sun, or photosphere, gets smaller and smaller, there eventually remains a very thin arc of light. It is like several point sources of light side by side. Light from these point sources gets slightly diverted in different directions as it enters the turbulent atmosphere of the Earth. This phenomenon is called refraction. The shifting points of light form a wave-like pattern on the ground. If you place a white sheet on the ground, you will be able to see alternating light and dark wavy lines. Some people get the feeling that they are in a pit full of snakes crawling all around. This is probably why in earlier times people were advised not to be on open ground during a total solar eclipse. Shadow bands occur just before and after totality.

Baily's beads: Baily's beads appear just before **second contact**. At this point, the Sun's photosphere is almost totally covered by the Moon. But since the surface of the Moon is not smooth, sunlight peeps out through the valleys and is blocked by the mountains on the Moon. The result is 'beads' of light reaching the earth, producing a striking effect across the dark rim of the Moon.

Diamond ring: Immediately after Baily's beads, as the last bits of sunlight get filtered out by the Moon, the final ray of light passing through the Moon's edge looks like a glittering diamond ring. This is one of the most spectacular sights in the cosmos that human beings can ever witness.

Note: Just after Baily's beads appear, camera crew may take off their filters, but people should continue to keep their solar filters on till the appearance of the corona. The filters may be kept off the eyes only as long as the corona is visible.

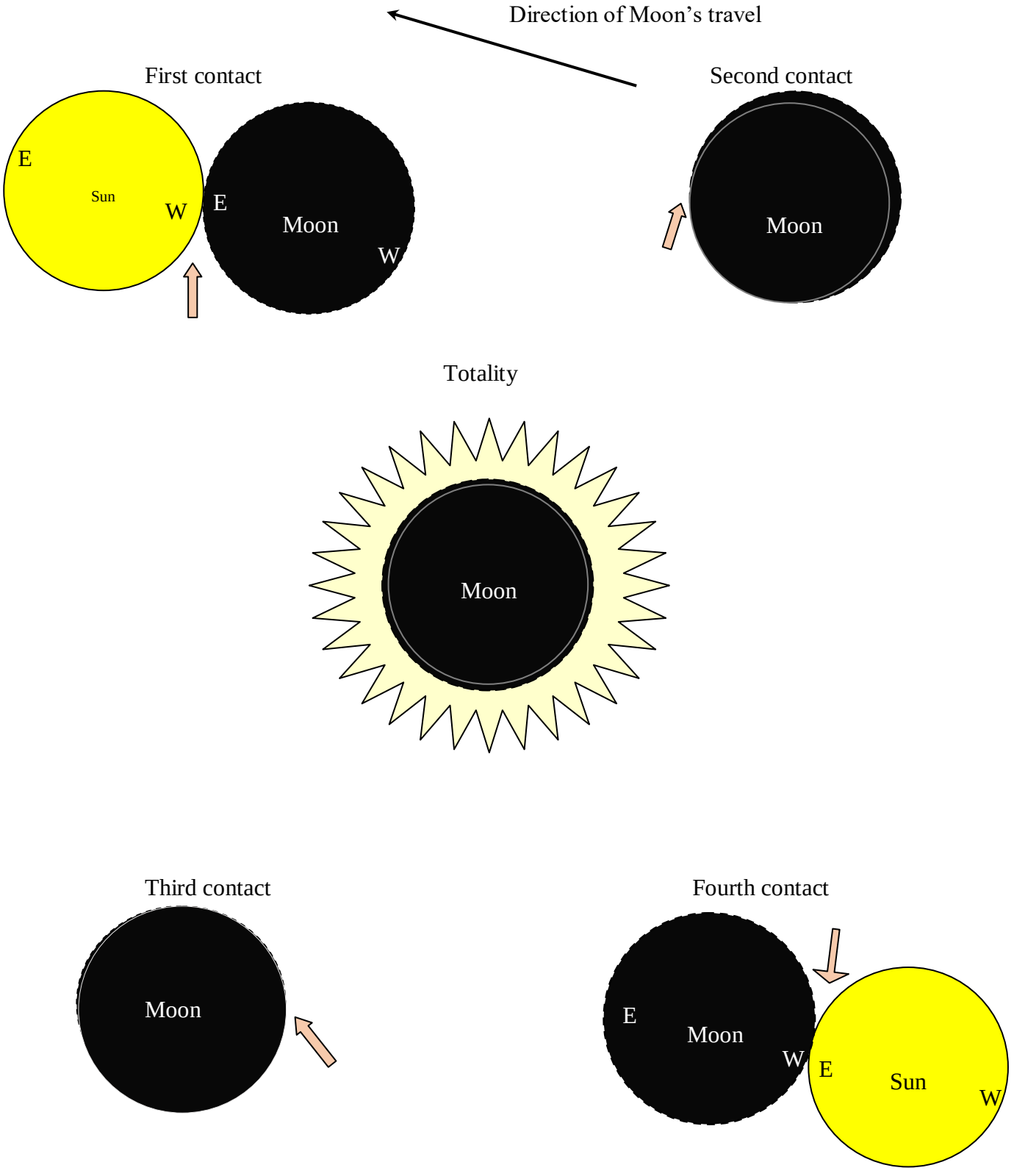
A second diamond ring appears immediately after third contact, and this is the time when all filters on equipment should be put back on. Visual observers should have their filters on immediately after the disappearance of the corona.

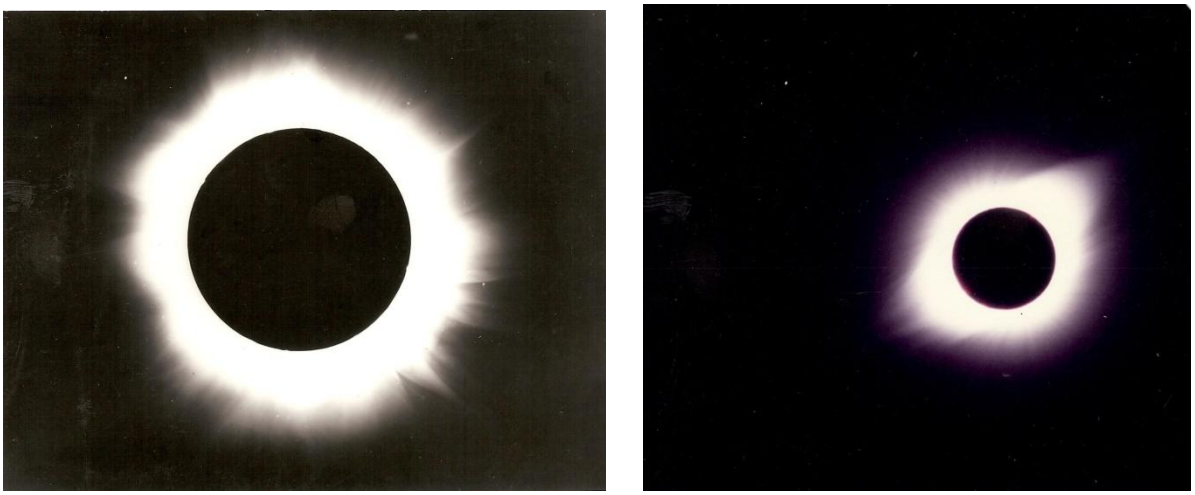
Flash spectrum: The outer atmosphere of the Sun, or the chromosphere, is masked by the photosphere on normal days. But during a total solar eclipse, the photosphere is hidden by the Moon, and astronomers can capture the spectral lines of the gases present in the chromosphere. This can be done only just before or after totality. This is called the flash spectrum and it tells us about the state of the chromosphere.

Corona: This is the outermost atmosphere of the Sun that can only be seen during totality. (At some high altitude solar observatories, though, astronomers have created artificial total solar eclipses to observe the corona.) The atmosphere of the corona is so rare that on normal days the brilliance of the Sun completely masks it. Although the gases are at a very high temperature, their density is so low that the corona is much less bright than the photosphere. The corona extends far out into space, and it is said that it even envelopes the Earth. The high temperature of the gas molecules is the cause of the 'solar wind' which is a stream of charged particles that travels across the solar system. The solar corona can take various shapes. The Sun has a magnetic field that affects the charged

particles in the corona and influences the coronal shape. During sunspot maximum the corona is almost symmetrical around the photosphere. During sunspot minimum the corona displays beams along the Sun's equator with short clusters at its poles. The charged particles of the corona also form streamers and loops.

After the corona disappears, the diamond ring, Baily's beads and shadow bands all reappear in reverse order.





Solar corona during total solar eclipses seen over India on 16 February 1980 (left) and 24 October 1995. Picture courtesy: https://www.iiap.res.in/?q=solareclipse

How to view a solar eclipse: It is *highly dangerous* to look at the Sun directly at any time during the year. The Sun emits strong ultraviolet and even gamma rays which can pass through the clouds. These rays are so energetic that they can instantly burn a hole through your retina. The retina does not have pain receptors; hence you will not immediately feel any sensation when your retina gets burnt. But you will notice the change in your vision after a short while. This damage is irreversible and there is no medical cure that can restore your eyesight.

On normal days, we do not habitually stare at the Sun because the Sun's glare prevents us from doing so. Our pupils naturally contract and almost shut our eyes so that little or no sunlight finds its way in. But during a solar eclipse, when much of the Sun's disc is covered by the Moon, there is no glare to contract our pupils. Hence by looking directly at the Sun we allow its harmful rays to enter our eyes, and can end up with serious, irreversible damage. The only exception to this rule is during the few minutes (or seconds) of totality, when the Sun's photosphere is completely hidden by the Moon. A rough guide for this is between the first and second diamond ring or while the corona is visible.

A solar eclipse should be viewed only with the correct precautions:

(i) Special solar filters that comply with the transmittance requirements of the ISO 12312-2 international standard. Please note that ordinary sunglasses are of no use and will damage your eyes. Mylar filters are especially manufactured to view solar light. These can also be fitted to your telescope or binoculars.*Please do not look directly at the Sun through the telescope/binoculars, it is very*

(ii) *dangerous.*

(iii) You may use number 14 arc wielders' glasses. Purchase only new ones. Used ones may have pinholes.

(ii) Projection of the Sun's image on a screen through a telescope. This is very effective and can enable a large number of people to view the eclipse together.Once again, *Please do not look directly at the Sun through the telescope/binoculars, it is very dangerous.*

(iii) The Sun's image can also be projected through a pinhole camera or any device with a pinhole.

Over the millennia, eclipses have been seen as bad omens, harbingers of something untoward. But this is not true. An eclipse is just a linear alignment of the Sun, Moon and Earth. A solar eclipse can occur only on New Moon, and a lunar eclipse on Full Moon. But eclipses do not take place every New Moon and Full Moon. That is because the orbits of

the Earth around the Sun and the Moon around the Earth are tilted at 5°. It is only when the three objects are aligned at the intersection of the orbits that we see an eclipse. We are fortunate that the Sun and the Moon visually appear to be almost of the same size from our vantage point on Earth, so that we are able to witness the many phenomena that make a total solar eclipse a truly memorable event.

Catching Comet Pons-Brooks by its Tail

Amateur astronomers and those interested in astronomical phenomena will likely be treated to the visual pleasure of seeing Comet Pons-Brooks by the beginning of April. This comet is also likely to be visible to the naked eye during the total solar eclipse that will take place on April 8, 2024, and be seen over North America.

Pons-Brooks is a historically famous comet with an orbit similar to Halley's Comet. The comet visits the Sun about every 71 years, whereas Halley's Comet approaches the Sun every 76 years. Comets that visit the Sun every 20 to 200 years are called periodic comets.

This Halley-type Comet 12P/Pons-Brooks was first discovered at the Marseilles Observatory by Jean-Louis Pons on 12 July 1812, and then independently rediscovered by William Robert Brooks in 1883. Pons was a French astronomer who discovered 37 comets between 1801 and 1827. He was the greatest visual comet discoverer at the time, and discovered about 75% of all comets during this period. Brooks was a British astronomer who built his first telescope at the age of 14. He had his own observatory and discovered more than 10 comets between 1881 and 1887. During his lifetime he discovered 27 comets, second only to Pons.

Pons-Brooks has an orbital period of about 71.3 years. During its closest approach to the Sun or perihelion, the comet comes to within about 0.78 astronomical units (AU) or 116.8 million km from the Sun. When it is at its farthest point, or aphelion, it is located at a distance of about 17.2 AU from the Sun. The closest approach to the Earth will be on 2 June 2024, when it will be 1.55 AU or 232 million km away.

On 10 June 2020, the Lowell Discovery Telescope recovered the comet on its way back towards the Sun. At that time, it was beyond the orbit of Saturn, at 11.9 astronomical units or 1.78 billion kilometres from the Sun. This is probably the most distant recovery of a returning periodic comet to date[1]. Its apparent magnitude at the time was 23. Pons-Brooks is known to undergo 'outbursts' which cause its magnitude to increase. An outburst was observed on 20 July 2023. Its magnitude increased by about five, from about 16 to 11. That marks a brightening by about 100 times. A horseshoe-shaped coma was seen. This is a gaseous cloud that develops around the nucleus of the comet as it starts to approach the Sun. There was another outburst on 5 August 2023. Since then, there have been five outbursts. The latest was observed on 18 January 2024.

By mid-February this year, it had brightened to a magnitude of 7.5 and developed an ion tail. An ion tail forms out of the gases of the coma that get ionised by the Sun's ultraviolet rays and blown away by the solar wind. Comet 12P/Pons-Brooks is expected to reach a maximum apparent magnitude of 4.5. The comet is expected to reach perihelion on 21 April. This is just a couple of weeks after the total solar eclipse on April 8, 2024, and will present eclipse-watchers with a unique opportunity to see it during the eclipse. It will be about 25 degrees east of the Sun. The best time to watch the Comet is during the first ten days of April.

After the total solar eclipse, a thin lunar crescent will appear about the western horizon after sunset. The next day on 10 April, the comet will be just about two degrees south of the lunar crescent. The lunar

[1] https://iopscience.iop.org/article/10.3847/2515-5172/aba2d1

First quarter is on 15 April, and with the Moon's magnitude at -10, the sky will be quite bright. After that, the glory of the comet's tail (if there is one), will be lost in the bright light of the Moon. Full Moon is on 23 April; by then, the comet will set before the end of twilight.

How bright a comet will become is quite unpredictable. We will be treated to a spectacular sight if there is a major outburst. Otherwise, it is not guaranteed to be visible to the naked eye, and viewers may need binoculars or telescopes to see it.

A reality check about observing the comet: You may see beautiful pictures of Comet Pons-Brooks in the newspapers or on social media. These pictures would have been taken by experienced astrophotographers using long exposures. But unless there is a favourable outburst, the comet is not likely to be as spectacular, even through a telescope.

Some Important Dates for Observing the Comet

On 31 March, the comet will be just below Hamal or alpha Arietis. By then, if the tail has significantly increased, it will occult the star. The angular distance between the two objects will be about 10 minutes of arc. The comet will be about 14 degrees northwest, i.e. to the right and below the star.

On 10 April, the comet can be spotted southeast, to the left and above the thin lunar crescent. It will be less than 2 degrees from the crescent Moon. The comet will be about 4.5 degrees south of Jupiter. The comet, the Moon and Jupiter will be visible in the same field of view through a pair of 7 X 50 binoculars. The same day, the comet's tail will occult the 5.3-magnitude star π Arietis. The comet's nucleus will be 0.4 degrees from the star.

On 13 April, the comet will make its closest approach to Jupiter. It will be seen less than 3 degrees west of Jupiter.

12P/Pons-Brooks will never be seen in the pre-dawn sky. As it moves southwards, observers in the southern hemisphere will be well placed to observe it.

Comet 12P/Pons-Brooks is the probable parent body of the κ-Draconids meteor shower, active from about 29 November to 13 December. Usually, about two meteors per hour are seen during this shower, but this year, one might observe more meteors per hour during the κ-Draconids meteor shower.

Historical Information

Going by ancient records, it is believed that a comet that was recorded by the Chinese in 245 CE (or AD), was actually Pons-Brooks. Asian astronomers recorded the appearance of comets in 1313 and 1668; these comets are also believed to be Pons-Brooks, although there is no consensus among astronomers.

But a comet that appeared in 1385 was definitely identified as Pons-Brooks. Its appearance was recorded by the Ming Dynasty in China, and also by some European observers. Chinese and European observers once again recorded the appearance of the comet in 1457.

In 1953 the comet made an appearance again, and increased in brightness from magnitude 18 to 13 on 1 July 1953. It reached perihelion on 22 May, 1954 and was last observed on 4 September 1954.

In recent times Pons-Brooks was observed by the Lowell Discovery Telescope at apparent magnitude 23, when it was beyond the orbit of Saturn, on 10 June 2020.

At a Glance:

245	First recorded by Chinese astronomers
1313	Recorded by Asian astronomers but no consensus on identity
1385	Recorded by Ming Dynasty and European astronomers and identified later as Pons-Brooks
1457	Recorded by European observers and again identified later as Pons-Brooks
1668	Recorded by Asian astronomers but no consensus on identity
1812	Discovered by Jean-Louis Pons, and named later after him

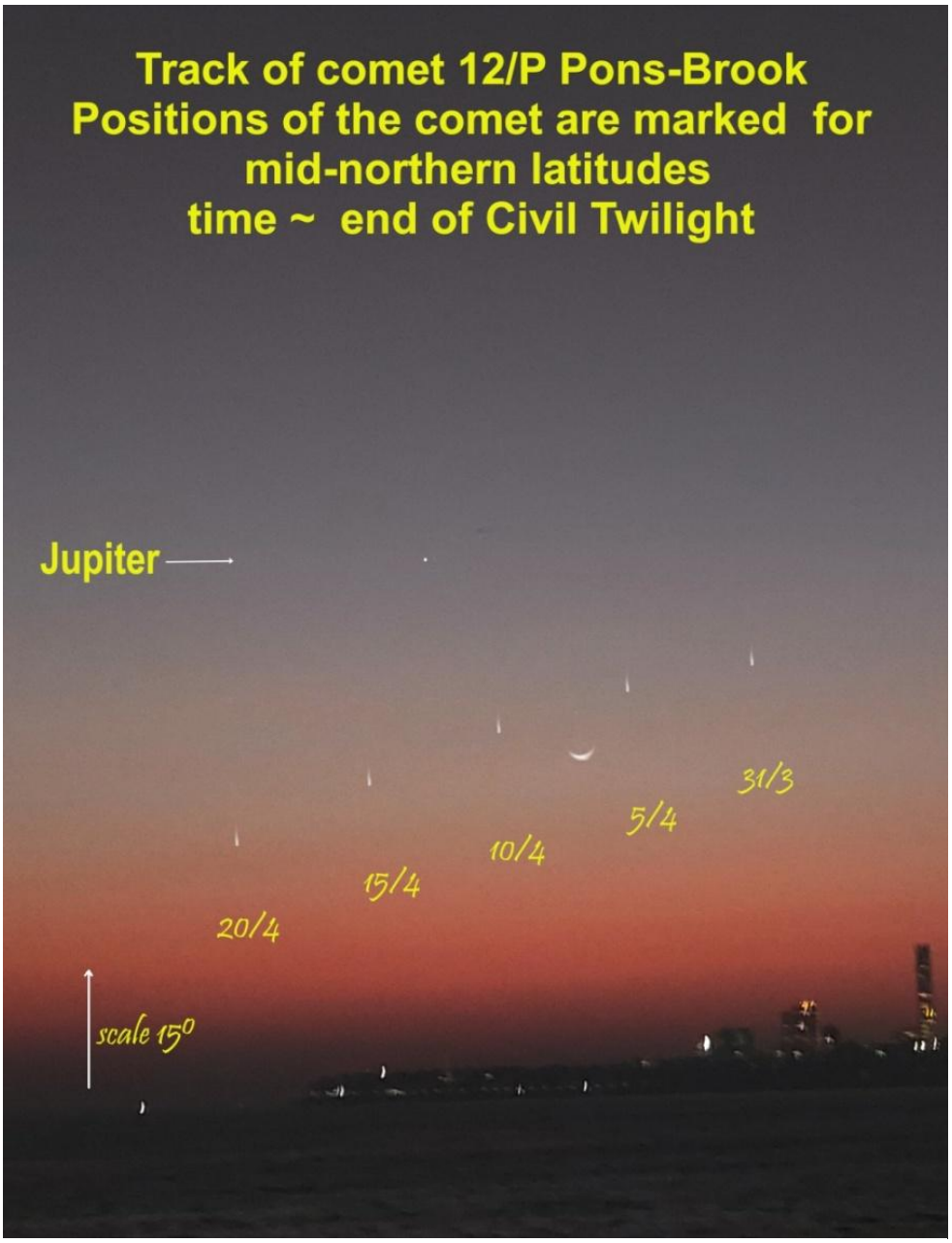
1884 Discovered accidently by William Robert Brooks and later identified with Pons' comet of 1812

1954 Pons-Brooks made another approach towards the Sun and was associated with several meteors that entered Earth's atmosphere after it ceased to be visible.

2020 Observed through the Lowell Discovery Telescope at a distance beyond the orbit of Saturn

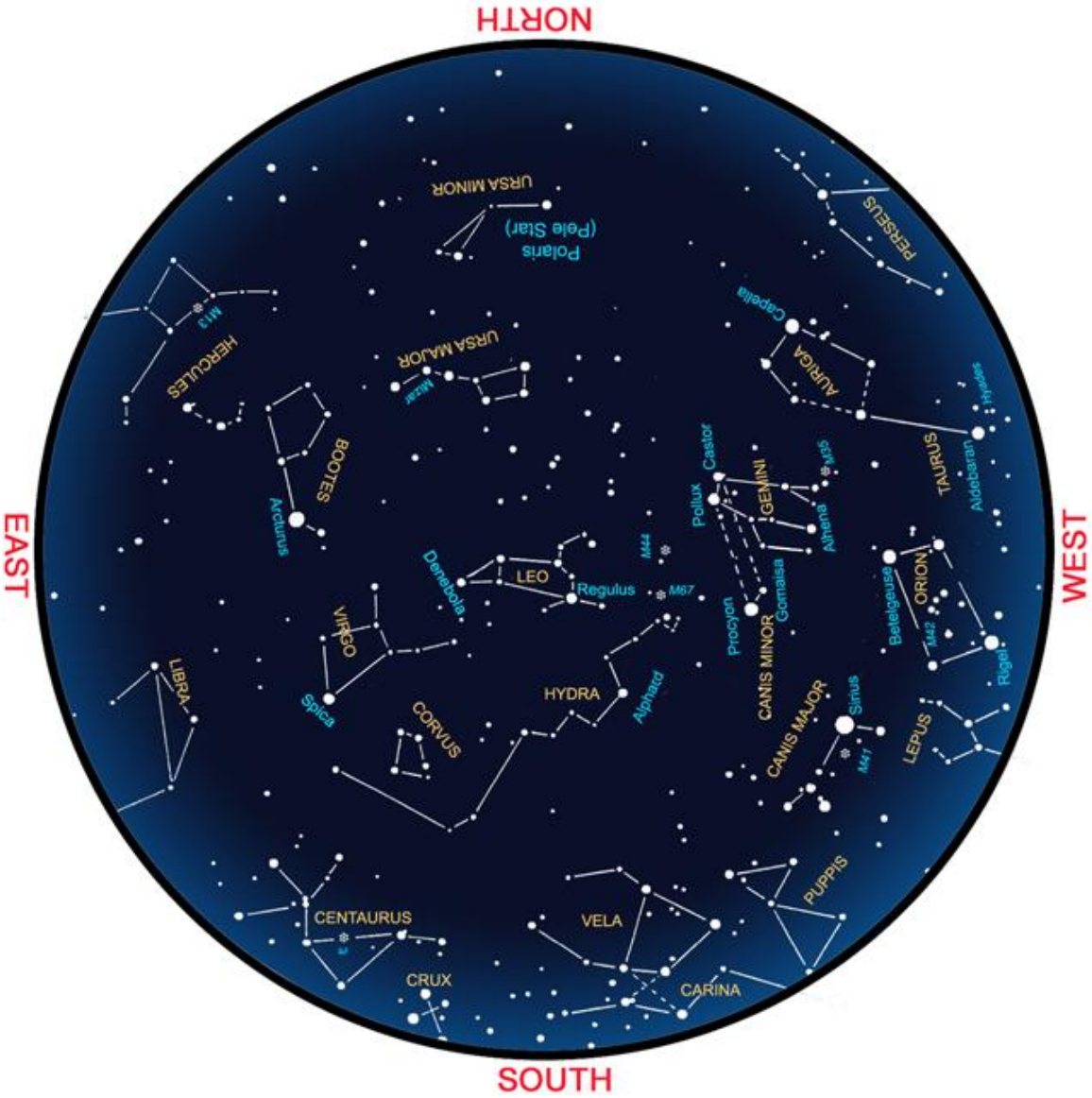
2023 Slowly increasing in magnitude.

Information sourced from: https://en.wikipedia.org/wiki/12P/Pons%E2%80%93Brooks



Computer artist's depiction of the positions of Pons-Brooks between 31 March and 20 April 2024. The picture contrast has been enhanced artificially for visual clarity.

This sky map for April is drawn for mid-northern latitudes, to be used around 9:30 p.m. local time



For notes on stargazing click here.

Or visit https://skytonight.wordpress.com/monthly-sky-notes-and-links/

Acknowledgements:

http://www.lunar-occultations.com/iota/occult4.htm

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https://www.gimp.org/

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