IMPORTANT ASTRONOMICAL EVENTS FOR THE YEAR 2020

January

3, 4 Quadrantids Meteor Shower. The Quadrantids is a meteor shower, with up to 40 meteors per hour. It is thought to be produced by dust grains left behind by an extinct comet known as 2003 EH1, which was discovered in 2003. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Bootes.

5 Earth closest to the Sun. Moves at a distance of about 14,70,90,610 km

11 Full Moon.

10/11 Penumbral Lunar Eclipse. The shadow of the Earth cast by the Sunlight will have two components. One is darker shadow or umbra and the other is lighter shadow or penumbra. For a person on the Moon, from the darker shadow, the Sun cannot be seen, however from the lighter shadow part, a portion of the Sun will be visible. When the entire disk of the Moon crosses the darker shadow, the eclipse is known as total lunar eclipse. However some times, the disk of the Moon will cross the Earth's lighter shadow. A penumbral lunar eclipse occurs when the Moon passes through the Earth's partial shadow, or penumbra. During this type of eclipse the Moon will darken very slightly. The eclipse will be visible throughout most of Europe, Africa, Asia, the Indian Ocean, and Western Australia. Penumbral eclipse begins at 22:36 hrs (IST) on 10th and ends at 02:43 hrs (IST) on 11th. Middle of the Eclipse will be at 00:40 hrs (IST) on 11th.. Visible from India. However there will not be any significant change in the brightness of the Moon like partial or total eclipse of the Moon.

25 New Moon.

February

9 Full Moon, Supermoon (Perigee Full Moon). This is the first of four supermoons for 2020. The Moon will be at its closest approach to the Earth (362956 km) and may look slightly larger and brighter than usual.

10 Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 18.2 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.

23 New Moon.

March

9 Full Moon, Supermoon (Perigee Full Moon). This is the second of four supermoons for 2020. The Moon will be at its closest approach to the Earth (358180 km) and may look slightly larger and brighter than usual.

20 March Equinox. The March equinox occurs at 09:20 IST. The Sun will shine directly on the equator and there will be nearly equal amounts of day and night throughout the world. This is also the first day of spring (vernal equinox) in the Northern Hemisphere and the first day of fall (autumnal equinox) in the Southern Hemisphere.

24 New Moon.

24 Mercury at Greatest Western Elongation. The planet Mercury reaches greatest western elongation of 27.8 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the morning sky. Look for the planet low in the eastern sky just before sunrise.

24 - Venus at Greatest Eastern Elongation. The planet Venus reaches greatest eastern elongation of 46.1 degrees from the Sun. This is the best time to view Venus since it will be at its highest point above the horizon in the evening sky. Look for the bright planet in the western sky after sunset.

April

8 Full Moon, Supermoon (Perigee Full Moon). This is the third of four supermoons for 2020. The Moon will be at its closest approach to the Earth (356850 km) and may look slightly larger and brighter than usual.

22, 23 Lyrids Meteor Shower. It produces about 20 meteors per hour at its peak. It is produced by dust particles left behind by comet C/1861 G1 Thatcher, which was discovered in 1861. Meteors will radiate from the constellation Lyra.

23 New Moon.

May

6, 7 Eta Aquarids Meteor Shower. It is capable of producing up to 60 meteors per hour at its peak. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky.

7 Full Moon, Supermoon (Perigee Full Moon). This is the last of four supermoons for 2020. The Moon will be at its closest approach to the Earth (360781 km) and may look slightly larger and brighter than usual.

22 New Moon.

June

4 Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 23.6 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky.

6 Full Moon.

5/6 Penumbral Lunar Eclipse. A penumbral lunar eclipse occurs when the Moon passes through the Earth's partial shadow, or penumbra (details can be seen in Jan 10/11 Penumbral lunar eclipse section above). During this type of eclipse the Moon will darken very slightly but not completely. The eclipse will be visible throughout most of Europe, Africa, Asia, Australia, the Indian Ocean, and Australia. Penumbral eclipse begins at 23:13 hrs (IST) on 5th and ends at 02:36 hrs (IST) on 6th. Middle of the Eclipse will be at 00:55 hrs (IST) on 5th. Visible from India.

21 New Moon.

21 Annular Solar Eclipse. An annular solar eclipse occurs when the Moon is too far away from the Earth to completely cover the Sun. This results in a ring of light around the darkened Moon. The Sun's corona is not visible during an annular eclipse. The path of the eclipse will begin in central Africa and travel through Saudi Arabia, northern India, and southern China before ending in the Pacific Ocean. A partial eclipse will be visible throughout most of eastern Africa, the Middle East, and southern Asia. Visible from India. Annular Phase is visible from places like Chamoli, Dehradun, Joshimath, Kurukshetra, Sirsa, Suratgarh in northern India.

Places	Annular phase Begins(IST)	Greatest Eclipse (IST)	Maximum Obscuration	Annular phase Ends (IST)	Duration of Annularity m:s
Chamoli	12:08.7	12:09.1	98.6%	12:09.4.	00:38
Dehradun	12:05.0	12:05.3	98.6%	12:05.6	00:31

Joshimath	12:09.5	12 09.8	98.6%	12:10.2	00:39
Kurukshetra	12:01.4	12 01.8	98.6%	12:02.1	00:39
Sirsa	11:55.9	11 56.1	98.6%	11:56.4	00:36
Suratgarh	11:52.5	11 52.9	98.6%	11:53.3	00:45

In other parts of India partial eclipse will be visible.

Places	Partial Eclipse Begins (IST)	Greatest Eclipse (IST)	Maximum Obscuration	Partial Phase Ends	Duration of Eclipse hh:mm
Chennai	10:22	11:58	34%	13:41	03:19
Vellore	10:18	11:54	33%	13:37	03:19
Coimbatore	10:12	11:43	30%	13:23	03:12
Tiruchirappalli	10:18	11:49	28%	13:29	03:11
Madurai	10:17	11:46	26.6	13:24	03:07
Kanyakumari	10:18	11:42	21%	13:15	02:58
Puducherry	10:21	11:56	31%	13:36	03:15
Delhi	10:20	12:01	94%	13:48	03:28

23 June Solstice. The June solstice occurs at 03:14 IST. The North Pole of the earth will be tilted toward the Sun, which will have reached its northernmost position in the sky and will be directly over the Tropic of Cancer at 23.44 degrees north latitude. This is the first day of summer (summer solstice) in the Northern Hemisphere and the first day of winter (winter solstice) in the Southern Hemisphere.

July

5 Full Moon.

5 Penumbral Lunar Eclipse. A penumbral lunar eclipse occurs when the Moon passes through the Earth's partial shadow, or penumbra. During this type of eclipse the Moon will darken slightly but not completely. (details can be seen in Jan 10/11 Penumbral lunar eclipse section above). The eclipse will be visible throughout most of North America, South America, the eastern Pacific Ocean, the western Atlantic Ocean, and extreme western Africa. Penumbral eclipse begins at 08:34 hrs (IST) and ends at 11:36 hrs (IST). Middle of the Eclipse will be at 10:00 hrs (IST). Not Visible from India.

14 Jupiter at Opposition. Jupiter oppositions repeat after about one year and one month (~ 399 days). The giant planet will be diametrically opposite to the Sun and will be at its closest approach to the Earth. It comes to a distance of about 62 crore km. Its face will

be fully illuminated by the Sun. It will have a visual magnitude of -2.7, with an angular diameter of 47.6 arc seconds. Jupiter will be in the constellation Ophiuchus. Again on 19th August 2021, Jupiter will be at opposition.

20 New Moon.

20 Saturn at Opposition. (Distance 134 crore km). The ringed planet will be at its closest approach to Earth and its face will be fully illuminated by the Sun. This is the best time to view Saturn. It rises inside the constellation Sagittarius. It will have a visual magnitude of 0.1, and an angular diameter of 42 arc seconds from ring tip to ring tip, the disk of the planet will be 18.5 arc seconds wide. The Planet will be at a distance of 134.4 crore km away at this closest approach. the rings will be inclined at an angle of 22° to our line of sight. A medium-sized or larger telescope will allow us to see Saturn's rings and a few of its brightest moons. Opposition of Saturn will occur about once every 378 days. Next Saturn opposition will occur on 2 August 2021.

22 Mercury at Greatest Western Elongation. The planet Mercury reaches greatest western elongation of 20.1 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the morning sky The planet can be spotted low in the eastern sky just before sunrise.

28, 29 Delta Aquarids Meteor Shower. The Delta Aquarids shower can produce up to 20 meteors per hour. It is produced by debris left behind by comets Marsden and Kracht. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky.

August

3 Full Moon.

12, 13 Perseids Meteor Shower. The Perseids is one of the best meteor showers to observe, producing up to 60 meteors per hour at its peak. It is produced by comet Swift-Tuttle, which was discovered in 1862. Meteors will radiate from the constellation Perseus.

13 Venus at Greatest Western Elongation.

The planet Venus reaches greatest eastern elongation of 45.8 degrees from the Sun. Visible in the Eastern sky before and at Sunrise.

19 New Moon.

September

2 Full Moon.

17 New Moon.

22 September Equinox. The September equinox occurs at 19:01 IST. The Sun will shine directly on the equator and there will be nearly equal amounts of day and night throughout the world. This is also the first day of fall (autumnal equinox) in the Northern Hemisphere and the first day of spring (vernal equinox) in the Southern Hemisphere.

October

1 Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 25.8 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky.The Planet can be spotted low in the western sky just after sunset.

2 Full Moon.

7 Draconids Meteor Shower. The Draconids is a minor meteor shower producing only about 10 meteors per hour. It is produced by dust grains left behind by comet 21P Giacobini-Zinner, which was first discovered in 1900. Meteors will radiate from the constellation Draco.

13 Mars at Opposition.

The last Mars opposition occurred on July 27, 2018 at a distance of about 5.77 crore km but this time it will be at a distance of about 6.2 crore km. Next mars opposition will occur on December 8th, 2022 at that time it will come to a distance of 8.21 crore km.

As Mars approaches opposition it begins a period of retrograde motion, which makes it appear to move backwards in a looping motion relative to the background stars. The duration of this retrograde motion is about 72 days. Mars Opposition happen once in about 2 years and 50 days.

However, Closest approach occurs on October 06, 2020 with an apparent planetary disk diameter of 22.6'' at a distance of 6.20 crore km. During closest approach in 2020 the apparent diameter of Mars will be 1.7 arcsec smaller than it was at the same period in 2018. (It should be noted that closest approach between Earth and Mars is not necessarily coincident with the time of opposition but varies by as much as two weeks. Mars is not necessarily closest at opposition because of its elliptical orbit, however there will not be any drastic variation in distance within the short period.

The distance at close approach varies between about 5.4 crore and about 10.3 crore km). Opposition occurs when Earth and Mars lie nearly in a straight line with respect to the Sun, or five weeks after retrogression begins. Opposition occurs on October 13, 2020 with an apparent planetary disk diameter of 22.4 arcsec. Mars will remain visible for more than 12 months after opposition and then become lost in the glare of the Sun around September 01, 2021 as it approaches the next conjunction (October 08, 2021). The cycle is complete in 780 Earth days.

17 New Moon.

21, 22 Orionids Meteor Shower. The Orionids is an average shower producing up to 20 meteors per hour at its peak. It is produced by dust grains left behind by comet Halley. Meteors will radiate from the constellation Orion, but can appear anywhere in the sky.

31 Full Moon, Blue Moon. Since this is the second full moon in the same month, it is sometimes referred to as a blue moon. This rare calendar event only occurs every few months, giving rise to the term "once in a blue moon".

November

4, 5 Taurids Meteor Shower. The Taurids is a long-running minor meteor shower producing only bout 5-10 meteors per hour. It is unusual in that it consists of two separate streams. The first is produced by dust grains left behind by Asteroid 2004 TG10. The second stream is produced by debris left behind by Comet 2P Encke. Meteors will radiate from the constellation Taurus, but can appear anywhere in the sky.

10 Mercury at Greatest Western Elongation. The planet Mercury reaches greatest western elongation of 19.1 degrees from the Sun. The planet can be spotted low in the eastern sky just before sunrise.

15 New Moon.

17, 18 Leonids Meteor Shower. The Leonids is an average shower, producing up to 15 meteors per hour at its peak. The Leonids is produced by dust grains left behind by comet Tempel-Tuttle, which was discovered in 1865. Meteors will radiate from the constellation Leo, but can appear anywhere in the sky.

30 Full Moon.

30 Penumbral Lunar Eclipse. A penumbral lunar eclipse occurs when the Moon passes through the Earth's partial shadow, or penumbra. During this type of eclipse the Moon will darken slightly but not completely. (details can be seen in Jan 10/11 Penumbral lunar eclipse section above).The eclipse will be visible throughout most of North America, the Pacific Ocean, and northeastern Asia including Japan. Penumbral eclipse begins at 12:59 hrs (IST) and ends at 17:25 hrs (IST). Middle of the Eclipse will be at 15:13 hrs (IST). Not Visible from India.

December

13, 14 Geminids Meteor Shower. The Geminids is the king of the meteor showers. It is considered by many to be the best shower in the heavens, producing up to 120 multicolored meteors per hour at its peak. It is produced by debris left behind by an asteroid known as 3200 Phaethon, which was discovered in 1982. The nearly new moon will ensure dark skies for what should be an excellent show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Gemini, but can appear anywhere in the sky.

14 New Moon.

14 Total Solar Eclipse. A total solar eclipse occurs when the moon completely blocks the Sun, revealing the Sun's beautiful outer atmosphere known as the corona. The path of totality will only be visible in parts of southern Chile and southern Argentina. A partial eclipse will be visible in most parts of southern South America, the southeastern Pacific Ocean and the southern Atlantic Ocean.

21 December Solstice. The December solstice occurs at 15:32 IST. The South Pole of the earth will be tilted toward the Sun, which will have reached its southernmost position in the sky and will be directly over the Tropic of Capricorn at 23.44 degrees south latitude. This is the first day of winter (winter solstice) in the Northern Hemisphere and the first day of summer (summer solstice) in the Southern Hemisphere.

21 Rare Conjunction of Jupiter and Saturn. A conjunction of Jupiter and Saturn will take place on December 21. This rare conjunction of these two planets is known as a great conjunction. The last great conjunction occurred in the year 2000. The two bright planets will appear only 7 arc minutes of each other in the night sky. They will be so close that they will appear to make a bright double planet. Can be seen in the west just after sunset for this impressive and rare planetary pair.

21, 22 Ursids Meteor Shower. The Ursids is a minor meteor shower producing about 5-10 meteors per hour. It is produced by dust grains left behind by comet Tuttle, which was first discovered in 1790. Meteors will radiate from the constellation Ursa Minor, but can appear anywhere in the sky.

30 Full Moon.

IMPORTANT ASTRONOMICAL EVENTS FOR THE YEAR 2019

January

3 Earth closest to the Sun. Moves at a distance of about 147,099,760 km

3, 4 Quadrantids Meteor Shower. The Quadrantids is a meteor shower, with up to 40 meteors per hour. It is thought to be produced by dust grains left behind by an extinct comet known as 2003 EH1, which was discovered in 2003. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Bootes.

6 Venus at Greatest Western Elongation. The planet Venus reaches greatest Western elongation of 46.9 degrees from the Sun. Visible in the Eastern sky before and at Sunrise.

6 New Moon.

6 Partial Eclipse of the Sun. A partial solar eclipse occurs when the Moon covers only a part of the Sun, sometimes resembling a bite taken out of a cookie. A partial solar eclipse will be visible in parts of eastern Asia and the northern Pacific Ocean. It will be best seen from northeastern Russia with 62% coverage. This partial solar eclipse is visible from locations in north Pacific and northeast Asia, including Beijing, Irkutsk in Russia, Seoul, Taipei, and Tokyo. The eclipse, globally begins at 05:04 hrs (IST). The greatest eclipse is at 07:11 hrs (IST) and the eclipse ends at 09:19 hrs (IST). The eclipse is not visible in India

9 Moon at farthest distance from the Earth (406116 km)

21 Full Moon, Supermoon (Perigee Full Moon). This is the first of three supermoons for 2019. The Moon will be at its closest approach to the Earth (357300 km) and may look slightly larger and brighter than usual.

21 Total Lunar Eclipse. A total lunar eclipse occurs when the Moon passes completely through the Earth's dark shadow, or umbra. During this type of eclipse, the Moon will gradually get darker and then take on a rusty or blood red color. The eclipse will be visible throughout most of North America, South America, the eastern Pacific Ocean, western Atlantic Ocean, extreme Western Europe, and extreme western Africa. The partial phase begins at 09:03 hrs (IST), Total Phase begins at 10:11 hrs (IST), Mid eclipse is at 10:42 hrs (IST), total phase ends at 11:14 hrs (IST) and the partial phase finally ends at 12:21 hrs (IST).This eclipse is not visible in India

22 Moon at a distance of 357,342 km (Closest approach)

22 Conjunction of Venus and Jupiter. The two bright planets will be visible, within 2.4 degrees of each other in the early morning sky, in the east just before sunrise.

February

4 New Moon.

5 Moon at farthest distance from the Earth (406556 km)

19 Full Moon, Supermoon (Perigee Full Moon) .This is the second of three supermoons for 2019. The Moon will be at its closest approach to the Earth and may look slightly larger and brighter than usual.

19 Moon at a distance of 356,761 km (Closest approach)

27 Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 18.1 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.

March

4 Moon at farthest distance from the Earth (406391 km)

6 New Moon.

17 Moon within 0,5 degree South of Beehive Cluster Evening Sky

20 Moon at a distance of 359,377 km (Closest approach)

21 March Equinox. The March equinox occurs at 03:28 IST. The Sun will shine directly on the equator and there will be nearly equal amounts of day and night throughout the world. This is also the first day of spring (vernal equinox) in the Northern Hemisphere and the first day of fall (autumnal equinox) in the Southern Hemisphere.

21 Full Moon, Supermoon (Perigee Full Moon). This is the last of three supermoons for 2019. The Moon will be at its closest approach to the Earth and may look slightly larger and brighter than usual.

April

1 Moon at farthest distance from the Earth (405557 km)

5 New Moon.

11 Mercury at Greatest Western Elongation. The planet Mercury reaches greatest western elongation of 27.7 degrees from the Sun. The planet can be seen low in the eastern sky just before sunrise.

17 Moon at a distance of 364,205 km(Closest approach)

19 Full Moon

22, 23 Lyrids Meteor Shower.It produces about 20 meteors per hour at its peak. It is produced by dust particles left behind by comet C/1861 G1 Thatcher, which was discovered in 1861. Meteors will radiate from the constellation Lyra.

28 Moon at farthest distance from the Earth (404577 km)

May

5 New Moon

6, 7 Eta Aquarids Meteor Shower.It is capable of producing up to 60 meteors per hour at its peak. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky.

14 Moon at a distance of 369,009 km(Closest approach)

18 Full Moon

23 Before Sunrise Saturn 0.5 N of Moon

26 Moon at farthest distance from the Earth (404134 km)

June

3 New Moon

8 Moon at a distance of 368,504 km (Closest approach)

10 Jupiter at Opposition. Jupiter oppositions repeat after about one year and one month (~ 399 days). The giant planet will be diametrically opposite to the Sun and will be at its closest approach to the Earth. It comes to a distance of about 64 crore km. Its face will be fully illuminated by the Sun. It will have a visual magnitude of -2.6, with an angular diameter of 45 arc seconds. Jupiter will be in the constellation Ophiuchus. Again on 14th July 2020, Jupiter will be at opposition.

17 Full Moon.

18 Mercury 0.2° of Mars (before Sunset – west)

21 June Solstice. The June solstice occurs at 21:24IST. The North Pole of the earth will be tilted toward the Sun, which will have reached its northernmost position in the sky and will be directly over the Tropic of Cancer at 23.44 degrees north latitude. This is the first day of summer (summer solstice) in the Northern Hemisphere and the first day of winter (winter solstice) in the Southern Hemisphere.

23 Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 25.2 degrees from the Sun. The planet will be visible low in the western sky just after sunset.

23 Moon at farthest distance from the Earth (404549 km)

July

2 New Moon.

2/3 Total Solar Eclipse. A total solar eclipse occurs when the moon completely blocks the Sun, revealing the Sun's beautiful outer atmosphere known as the corona. The path of totality will only be visible in parts of the southern pacific Ocean, central Chile, and central Argentina. A partial eclipse will be visible in most parts of the southern Pacific Ocean and western South America. Globally the partial eclipse begins at 22:25 Hrs (IST) and ends at 03:20 hrs (IST) of 3 July 2019. Total eclipse begins at 23:31 hrs (IST) and ends at 02:14 hrs (IST of 3 July 2019. Maximum eclipse will occur at 00:53 hrs (IST) (3 July 2019)

5 Moon at a distance of 363,726 km (Closest approach)

6 Earth at farthest distance from the Sun. Moves at 152,104,285 km

10 Saturn Opposition. (03:08 IST; Distance 134 crore km). The ringed planet will be at its closest approach to Earth and its face will be fully illuminated by the Sun. This is the best time to view Saturn. It rises inside the constellation Sagittarius. It will have a visual magnitude of 0.1, and an angular diameter of 42 arc seconds from ring tip to ring tip, the disk of the planet will be 18.4 arc seconds wide. The Planet will be at a distance of 135.1 crore km away at this closest approach. the rings will be inclined at an angle of 24° to our line of sight. A medium-sized or larger telescope will allow us to see Saturn's rings and a few of its brightest moons. Opposition of Saturn will occur about once every 378 days. Next Saturn opposition will occur on 21 July 2020.

13 Mars 0.4°S of Beehive (Evening Sky – West)

17 Full Moon.

17 Partial Lunar Eclipse. A partial lunar eclipse occurs when the Moon passes through the Earth's partial shadow, or penumbra, and only a portion of it passes through the darkest shadow, or umbra. During this type of eclipse a part of the Moon will darken as it moves through the Earth's shadow. The eclipse will be visible throughout most of Europe, Africa, central Asia, and the Indian Ocean. Visible in India.The partial phase begins at

01:31 hrs (IST) on 17th July 2019.,Maximum eclipse is at 03:01 hrs (IST), and the partial phase finally ends at 04:30 hrs (IST).

21 Moon at farthest distance from the Earth (405480 km)

28, 29 Delta Aquarids Meteor Shower. The Delta Aquaridsshower can produce up to 20 meteors per hour. It is produced by debris left behind by comets Marsden and Kracht. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky.

August

1 New Moon.

2 Moon at a distance of 359,398 km (Closest approach)

9 Mercury at Greatest Western Elongation. The planet Mercury reaches greatest western elongation of 19.0 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the morning sky. The planet can be spotted low in the eastern sky just before sunrise.

12, 13 Perseids Meteor Shower. The Perseids is one of the best meteor showers to observe, producing up to 60 meteors per hour at its peak. It is produced by comet Swift-Tuttle, which was discovered in 1862. Meteors will radiate from the constellation Perseus.

15 Full Moon.

17 Moon at farthest distance from the Earth (406244 km)

30 New Moon.

30 Moon at a distance of 357,177 km (Closest approach)

September

8 Saturn very close to Moon evening sky (Saturn Lunar Occultation)

13 Moon at farthest distance from the Earth (406378 km)

14 Full Moon.

23 September Equinox. The September equinox occurs at 13:20IST. The Sun will shine directly on the equator and there will be nearly equal amounts of day and night throughout the world.

28 New Moon.

30 Moon at a distance of 357,176 km (Closest approach)

October

8 Draconids Meteor Shower. The Draconids is a minor meteor shower producing only about 10 meteors per hour. It is produced by dust grains left behind by comet 21P Giacobini-Zinner, which was first discovered in 1900. Meteors will radiate from the constellation Draco.

10 Moon at farthest distance from the Earth (405902 km)

13 Full Moon.

20 Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 24.6 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. The planet can be spotted low in the western sky just after sunset.

21, 22 Orionids Meteor Shower.It is an average shower producing up to 20 meteors per hour at its peak. It is produced by dust grains left behind by comet Halley, which has been known and observed since ancient times. Meteors will radiate from the constellation Orion.

26 Moon at a distance of 361,311 km (Closest approach)

28 New Moon.

November

7 Moon at farthest distance from the Earth (405060 km)

11 Rare Transit of Mercury Across the Sun. The planet Mercury will move directly between the Earth and the Sun. Viewers with telescopes and approved solar filters will be able to observe the dark disk of the planet Mercury moving across the face of the Sun. This is an extremely rare event that occurs only once every few years. The next transit of Mercury will not take place until 2039. This transit will be visible throughout all of South America and Central America, and parts of North America, Mexico, Europe, the Middle East, and Africa. The best place to view this event in its entirety will be the eastern United States, Central America, and South America. Not visible in India.

12 Full Moon.

17, 18 Leonids Meteor Shower. The Leonids is an average shower, producing up to 15 meteors per hour at its peak. The Leonids is produced by dust grains left behind by comet

Tempel-Tuttle, which was discovered in 1865. Meteors will radiate from the constellation Leo.

23 Moon at a distance of 366,716 km (Closest approach)

24 Conjunction of Venus and Jupiter. The two bright planets will be visible within 1.4 degrees of each other in the evening sky. The conjunction can be observed n the western sky just after sunset.

26 New Moon.

28 Mercury at Greatest Western Elongation. The planet Mercury reaches greatest western elongation of 20.1 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the morning sky. The planet can be spotted low in the eastern sky just before sunrise.

28 Lunar Occultation Jupiter

29 Lunar Occultation Saturn

December

5 Moon at farthest distance from the Earth (404447 km)

12 Full Moon.

13, 14 Geminids Meteor Shower. The Geminids is the king of the meteor showers. It is considered by many to be the best shower in the heavens, producing up to 120 multicolored meteors per hour at its peak. It is produced by debris left behind by an asteroid known as 3200 Phaethon, which was discovered in 1982. The shower runs annually from December 7-17. It peaks this year on the night of the 13th and morning of the 14th. Meteors will radiate from the constellation Gemini, but can appear anywhere in the sky

19 Moon at a distance of 370,265 km (Closest approach).

22 December Solstice. The December solstice occurs at 09:49IST. The South Pole of the earth will be tilted toward the Sun, which will have reached its southernmost position in the sky and will be directly over the Tropic of Capricorn at 23.44 degrees south latitude. This is the first day of winter (winter solstice) in the Northern Hemisphere and the first day of summer (summer solstice) in the Southern Hemisphere.

26 New Moon.

26 Annular Solar Eclipse. An annular solar eclipse occurs when the Moon is too far away from the Earth to completely cover the Sun. This results in a ring of light around the darkened Moon. The Sun's corona is not visible during an annular eclipse. An annular eclipse of the Sun will take place on 26 December 2019. The path of the eclipse will begin in Saudi Arabia and move east through southern India, northern Sri Lanka, parts

of the Indian Ocean, and Indonesia before ending in the Pacific Ocean. A partial eclipse will be visible throughout most of Asia and northern Australia. The annular phase of the eclipse will be visible in Saudi Arabia, Qatar, United Arab Emirates, Oman, southern India, Sri Lanka, Sumatra, Malaysia, Maldives, Indonesia, Singapore, other parts of Southeast Asia and some parts of Australia.In Tamilnadu, the annular phase will be visible in the cities of Uthakamandalam, Coimbatore,Tirupur, Erode, Karur, Dindigul, Sivaganga, Tiruchirappalli, Pudukkottai and its adjoining areas.

Before the start of the annular phase, partial phase of the eclipse will begin. The timings of the visibility of the eclipse in various cities of Tamilnadu are given below.

Place	Partial Begins	Annular Begins	Maximum	Annular Ends	Partial Ends
Uthakamandalam	08:06	09:27	09:29	09:30	11:09
Coimbatore	08:06	09:28	09:29	09:31	11:11
Tirupur	08:06	09:28	09:30	09:31	11:12
Erode	08:07	09:29	09:30	09:31	11:13
Karur	08:07	09:30	09:31	09:32	11:14
Dindigul	08:07	09:30	09:31	09:33	11:14
Sivaganga	08:08	09:31	09:32	09:33	11:16
Tiruchirappalli	08:07	09:31	09:32	09:33	11:16
Pudukkottai	08:08	09:31	09:33	09:34	11:17
Chennai (partial eclipse)	08:09	--	09:35	--	11:19

In the places where annular eclipse occurs, over 93% of the disk of the Sun will be covered by the Moon.

In Chennai, only partial phase of the eclipse will be visible. However at maximum eclipse, 84.7% of the disk of the Sun will be covered by the Moon.

At Chennai, the eclipse begins at 08:09 hours (IST) and ends at 11.19 hours (IST). Maximum eclipse will be at 09:35 hours (IST).