

CELESTIAL EVENTS CALENDAR – APRIL 2014 TO MARCH 2015

*** Must See Event

2014

*****April 8 - Mars at Opposition.** The red 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 and photograph Mars. A medium-sized telescope will show you some of the dark details on the planet's orange surface and you might even be able to see one or both white polar ice caps.

April 15 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 15:42 hrs.

April 15 - 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. **Not visible from Singapore.**

April 22, 23 - Lyrids Meteor Shower. The Lyrids is an average shower, usually producing 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. The shower runs annually from April 16-25. It peaks this year on the night of the 22nd and morning of the 23rd. However, the last quarter moon will be blocking the less bright meteors from view. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Lyra, but can appear anywhere in the sky.

April 29 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 14:14 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

April 29 - 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 off the coast of South Africa and move across Antarctica and into the east coast of Australia. **Not visible from Singapore.**

*****May 5, 6 - Eta Aquarids Meteor Shower.** The Eta Aquarids is an above average shower, capable of producing up to 60 meteors per hour at its peak. Most of the activity is seen in the Southern Hemisphere. In the Northern Hemisphere, the rate can reach about 30 meteors per hour. It is produced by dust particles left behind by comet Halley, which has known and observed since ancient times. The shower runs annually from April 19 to May 28. It peaks this year on the night of May 5 and the morning of the May 6. The first quarter moon will set just after midnight leaving fairly dark skies for what should be a good show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky.

*****May 10 - Saturn at Opposition.** 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 and photograph Saturn and its moons. A medium-sized or larger telescope will show you Saturn's rings and a few of its brightest moons.

May 10 - Astronomy Day Part 1. Astronomy Day is an annual event intended to provide a means of interaction between the general public and various astronomy enthusiasts, groups and

professionals. The theme of Astronomy Day is "Bringing Astronomy to the People," and on this day astronomy and stargazing clubs and other organizations around the world will plan special events.

May 15 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 03:16 hrs.

*****May 24 - Possible Meteor Storm.** In the early morning hours of Saturday, May 24, the Earth will pass through the debris field left behind by a small comet known as P/209 LINEAR. Astronomers are predicting that this interaction may result in a brief but intense burst of meteor activity that could range from dozens to hundreds of meteors per hour. Nothing is certain, but many mathematical models are predicting that this could be the most intense meteor shower in more than a decade.

May 29 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 02:40 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

*****June 7 - Conjunction of the Moon and Mars.** The Moon will pass within two degrees of the planet Mars in the evening sky. The gibbous moon will be at magnitude -12.2 and Mars will be at magnitude -0.8. Look for both objects in the western sky just after sunset. The pair will be visible in the evening sky for about 6 hours after sunset.

June 13 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 12:11 hrs.

June 21 - June Solstice. The June solstice occurs at 18:51 hrs. 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.

June 27 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 16:08 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

July 12 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 19:25 hrs.

July 27 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 06:42 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

July 28, 29 - Delta Aquarids Meteor Shower. The Delta Aquarids is an average shower that can produce up to 20 meteors per hour at its peak. It is produced by debris left behind by comets Marsden and Kracht. The shower runs annually from July 12 to August 23. It peaks this year on the night of July 28 and morning of July 29. This should be a great year for this shower because the thin crescent moon will set early in the evening leaving dark skies for what should be a good show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Aquarius, but can appear anywhere in the sky.

August 11 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 02:09 hrs. This is also the closest and largest full Moon of the year, an annual event that has come to be known as a "supermoon" by the

media although it is only slightly larger and brighter than normal and most people are not really able to tell the difference.

*****August 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. The Perseids are famous for producing a large number of bright meteors. The shower runs annually from July 17 to August 24. It peaks this year on the night of August 12 and the morning of August 13. The waning gibbous moon will block out some of the meteors this year, but the Perseids are so bright and numerous that it should still be a good show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Perseus, but can appear anywhere in the sky.

*****August 18 - Conjunction of Venus and Jupiter.** Conjunctions are rare events where two or more objects will appear extremely close together in the night sky. The two brightest planets will come unusually close to each other, only a quarter of a degree, in the early morning sky. Also, the beehive cluster in the constellation Cancer will be only 1 degree away. This rare, double-planet event is definitely one not to miss. Look for the bright planets in the east just before sunrise.

August 25 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 22:13 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

*****August 29 - Neptune at Opposition.** The blue giant 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 and photograph Neptune. However, due to its extreme distance from Earth, it will only appear as a tiny blue dot in most amateur astronomer's telescopes.

September 9 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 09:38 hrs.

September 23 - September Equinox. The September equinox occurs at 10:29 hrs. 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.

September 24 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 14:14 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

October 4 - Astronomy Day Part 2. Astronomy Day is an annual event intended to provide a means of interaction between the general public and various astronomy enthusiasts, groups and professionals. The theme of Astronomy Day is "Bringing Astronomy to the People," and on this day astronomy and stargazing clubs and other organizations around the world will plan special events.

*****October 7 - Uranus at Opposition.** The blue-green 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 Uranus. However, due to its distance, it will only appear as a tiny blue-green dot in most amateur astronomer's telescopes.

October 8 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 18:51 hrs.

*****October 8 - 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. Visible from Singapore from about 18.55 hrs to 20.34 hrs. Note that the moon would already be in the Earth's umbra i.e. totally eclipsed, at moonrise.

October 8, 9 - 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. The shower runs annually from October 6-10 and peaks this year on the night of the 8th and morning of the 9th. Unfortunately the glare from the full moon this year will block out all but the brightest meteors. Best viewing will be just after midnight from a dark location far away from city lights. Meteors will radiate from the constellation Draco, but can appear anywhere in the sky.

*****October 22, 23 - 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, which has been known and observed since ancient times. The shower runs annually from October 2 to November 7. It peaks this year on the night of October 21 and the morning of October 22. This will be an excellent year for the Orionids because there will be no moon to interfere with the show. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Orion, but can appear anywhere in the sky.

October 24 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 05:57 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

October 23 - Partial Solar Eclipse. 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 can only be safely observed with a special solar filter or by looking at the Sun's reflection. Not visible from Singapore.

November 5, 6 - Taurids Meteor Shower. The Taurids is a long-running minor meteor shower producing only about 5-10 meteors per hour. It is unusual in that it consists of two separate streams. The first is produced by dust grains from Asteroid 2004 TG10. The second stream is produced by debris left behind by Comet 2P Encke. The shower runs annually from September 7 to December 10. It peaks this year on the night of November 5. Unfortunately the full moon will block out all but the brightest meteors. Best viewing will be just after midnight from a dark location far away from city lights. Meteors will radiate from the constellation Taurus, but can appear anywhere in the sky.

November 7 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 06:23 hrs.

November 17, 18 - Leonids Meteor Shower. The Leonids is an average shower, producing an average of up to 15 meteors per hour at its peak. This shower is unique in that it has a cyclonic peak about every 33 years where hundreds of meteors per hour can be seen. That last of these occurred in 2001. The Leonids is produced by dust grains left behind by comet Tempel-Tuttle, which was discovered in 1865. The shower runs annually from November 6-30. It peaks this year on the night of the 17th and morning of the 18th. The waning crescent moon will not be much of a problem this year. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Leo, but can appear anywhere in the sky.

November 22 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 20:32 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

December 6 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 20:27 hrs.

*****December 13, 14 - Geminids Meteor Shower.** The Geminids 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. The waning gibbous moon will block out some of the meteors this year. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Gemini, but can appear anywhere in the sky.

December 22 - December Solstice. The December solstice occurs at 07:03 hrs. 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.

December 22 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 09:36 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

December 22, 23 - Ursids Meteor Shower. The Ursids is a minor meteor shower producing only about 5-10 meteors per hour. It is produced by dust grains left behind by comet Tuttle, which was first discovered in 1790. The shower runs annually from December 17-25. It peaks this year on the the night of the 22nd. This will be one of the best years to observe the Ursids because there will be no moonlight to interfere with the show. Best viewing will be just after midnight from a dark location far away from city lights. Meteors will radiate from the constellation Ursa Minor, but can appear anywhere in the sky.

2015

January 3, 4 - Quadrantids Meteor Shower. The Quadrantids is an above average shower, with up to 40 meteors per hour at its peak. It is thought to be produced by dust grains left behind by an extinct comet known as 2003 EH1, which was discovered in 2003. The shower runs annually from January 1-5. It peaks this year on the night of the 3rd and morning of the 4th. Unfortunately, the nearly full moon will block out most of the meteors this year. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Bootes, but can appear anywhere in the sky.

January 5 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 12:53 hrs.

January 20 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 21:14 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

February 4 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 07:09 hrs.

*****February 6 - Jupiter at Opposition.** The giant 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 and photograph Jupiter and its moons. A medium-sized telescope should be able to show you some of the details in Jupiter's

cloud bands. A good pair of binoculars should allow you to see Jupiter's four largest moons, appearing as bright dots on either side of the planet.

February 19 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 07:47 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

*****February 22 - Conjunction of Venus and Mars.** Conjunctions are rare events where two or more objects will appear extremely close together in the night sky. The two bright planets will be visible within only half a degree of each other in the evening sky. Look to the west just after sunset.

March 6 - Full Moon. The Moon will be directly opposite the Earth from the Sun and will be fully illuminated as seen from Earth. This phase occurs at 02:05 hrs.

March 20 - New Moon. The Moon will be directly between the Earth and the Sun and will not be visible from Earth. This phase occurs at 17:36 hrs. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

March 20 - 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 begin in the central Atlantic Ocean and move north across Greenland and into northern Siberia. **Not visible from Singapore.**

March 21 - March Equinox. The March equinox occurs at 06:45 hrs. 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.