La Société Guernesiaise Astronomy Section

Astronomical events in 2019

as seen from Guernsey

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The main highlight year will be a transit of Mercury on 11 November. There will also be a total lunar eclipse on 21 January, coinciding with a supermoon.

PLANETS

Mercury will be visible in the periods around its greatest elongations:

Date	Elongation	Direction	Time
27 February	18º Eastern	Low in West	After sunset
11 April	28º Western	Low in East	Before sunrise
23 June	25º Eastern	Low in West	After sunset
09 August	19º Western	Low in East	Before sunrise
20 October	25º Eastern	Low in West	After sunset
28 November	20º Western	Low in East	Before sunrise

On the evening of 18 June Mercury will be just 0.2º above Mars.

On 11 November there will be a transit of Mercury across the face of the Sun for 5½ hours, almost four hours of which will be visible from our location. It will start at 12.35 pm. The small black disc of the planet will be seen crossing from the Sun's left side, almost across the centre of the solar disc, mid-transit being at 3.20 pm. The transit will end at 6.00 pm, but by then the Sun and Mercury will have set, at 4.30 pm. We will, however, have seen most of the transit.

It is dangerous to stare at the Sun or to observe it through any optical instrument. At just 10 arc-seconds the disc of Mercury is too small to see through eclipse glasses, so magnification will be required, eg a telescope or binoculars. They must, however, be protected by specialist solar filters. The Astronomy Section's observatory has appropriate equipment to provide safe observation, including a heliostat which projects a solar image onto a screen.

Transits of Mercury are quite rare, but occur much more frequently than transits of Venus. The last transit of Mercury was in 2016, and we were fortunate to observe it on that occasion, as we were in 2003. (The 2006 transit happened during our night-time.) We will have to wait until 2032 for the next one!

Venus will start the year as the "Morning Star" in the eastern pre-dawn sky, reaching greatest western elongation (47º) on 06 January. It will be at superior conjunction on 14 August, and by October will appear in the evening sky for the rest of the year. On the morning of 01 February a very thin crescent Moon will lie between Saturn, Venus and Jupiter low in the southeast sky.

A pdf file of diagrams showing apparitions of Mercury and Venus at sunrise or sunset, produced for the *Yearbook of Astronomy*, are at : https://www.yearbookofastronomy.com/mercury-venus-2019.pdf.

Mars will start the year as an evening object in the west, decreasing in altitude and disappearing by July. It will reach solar conjunction on 02 September, reappearing in October in the east before sunrise. It will remain a distant and small object during the year, not reaching opposition until October 2020.

At the beginning of the year **Jupiter** will be a morning object in the southeast before sunrise. It will reach opposition on 10 June in Ophiuchus, and will then remain an evening object until for the rest of the year, however never reaching a high altitude. On the evening of 09 August it will be just 1.6º from the Moon.

During the summer we will have good views of the four Galilean moons, atmospheric bands on the planet's disc, and the Great Red Spot. Transit, shadow and occultation events involving Jupiter's moons can be calculated using a Java script at http://www.skyandtelescope.com/wp-content/observing-tools/jupiter_moons/jupiter.html on the *Sky & Telescope* website. (You may need to register at http://tinyurl.com/24kp25 and remember to enter the date in the US format: month/day/year). They can also be found in the 2019 BAA Handbook (pages 60-68). They can be simulated on software such as StarryNight (http://www.starrynightstore.com/), and some of the many astronomy apps, including the *JupiterMoons* app ($2.99) by Sky & Telescope, which also gives the transit times of the Great Red Spot. The Spot's transit times are also available at http://www.skyandtelescope.com/observing/celestial-objects-to-watch/transit-times-of-jupiters-great-red-spot/ (again using the US date format).

Saturn will start the year in conjunction with the Sun, and therefore invisible. It will start appearing in February, low in the southeast before sunrise, rising earlier as the months go by. Opposition will be on 09 July in Sagittarius, the planet rising as the Sun sets, and visible all night, but with a maximum altitude of only 18º. It will remain visible as an evening object for the rest of the year. The rings are at a good angle for observation, and its brightest moons, especially Titan, should also be visible.

Saturn has several close visual encounters with the Moon this year. The first is on the morning of 02 February. As the Moon rises in the south-east at 06.16 am Saturn will be behind it, re-emerging from this very brief occultation at 06.30 am. The second is on 29 March at 04.30, when Saturn will be 0.6º above the Moon. And on 05 October at 9.30 pm Saturn will be 1.1º above the Moon, very low in the south-west.

Uranus will be at opposition in Aries on 28 October, at magnitude 5.7. **Neptune** will be at opposition in Aquarius on 10 September, at magnitude 7.8.

PHASES OF THE MOON

New Moon	First Quarter	Full Moon	Last Quarter
Jan 06	Jan 14	Jan 21	Jan 27
Feb 04	Feb 12	Feb 19	Feb 26
Mar 06	Mar 14	Mar 21	Mar 28
Apr 05	Apr 12	Apr 19	Apr 26
May 04	May 12	May 18	May 26
Jun 03	Jun 10	Jun 17	Jun 25
Jul 02	Jul 09	Jul 16	Jul 25
Aug 01	Aug 07	Aug 15	Aug 23
Aug 30	Sep 06	Sep 14	Sep 22
Sep 28	Oct 05	Oct 13	Oct 21
Oct 28	Nov 04	Nov 12	Nov 19
Nov 26	Dec 04	Dec 12	Dec 19
Dec 26			

SUPERMOONS

So-called 'supermoons' occur when the Full Moon happens to coincide with the Moon's closest approach to Earth ('perigee'), and therefore appear larger than usual. In 2019 there will be three such moons: on 21 January, 19 February, and 21 March.

DWARF PLANETS AND ASTEROIDS

Pluto will reach opposition on 14 July in Sagittarius, at magnitude 14.2. **Ceres** will be at opposition on 29 May in Scorpius, with magnitude 6.8. The other three dwarf planets (Eris, Makemake and Haumea) are too faint to be seen in most amateur telescopes.

The brightest asteroid **Vesta** will reach opposition on 11 November, when it will be magnitude 6 in Cetus, and about 6º from the Full Moon.

ECLIPSES

Every year there are at least four eclipses: two solar and two lunar. This year there are three solar and two lunar eclipses, but only the lunar ones are visible from Guernsey.

Our best eclipse this year is a total lunar one on the night of 20/21 January in the early hours of the morning. The Moon will start entering the penumbra of the Earth's shadow at 02.35 am and the umbra at 03.33 am, with the Moon then at an altitude of 41º. Totality runs from 04.40 to 05.43 am, mid-eclipse being at 05.12 am. The Moon will leave the umbra at 06.50 am (being then just 10º above the western horizon) and the penumbra at 07.49 am. This is a non-central eclipse, the Moon being towards the top of the shadow. If you want to watch just the main part of the eclipse I suggest good times would be 4.30 to 6.00 am. It should be a nice sight in binoculars, especially as it coincides with a 'supermoon'.

The second lunar eclipse is a partial one, on 16 July. The penumbral part of the eclipse starts while the Moon is still below the horizon. The umbral part starts as the Moon rises, at 9.00 pm, in the south-east. Maximum eclipse occurs at 10.30 pm, the Moon then being 66% eclipsed. The umbral phase ends at midnight, and the penumbral phase at 01.20 am. Times for this eclipse are in BST.

The solar eclipses occur on 06 January (a partial one, not visible from Guernsey), 02 July (a total one visible from the South Pacific and South America), and 26 December (an annular solar eclipse visible in the UAE, Oman, India and Asia). Be sure to take precautions not to look at the Sun directly unless your eyes and/or telescope are properly protected by a specialist solar filter.

OCCULTATIONS

Saturn will be occulted on the morning of 02 February. For details see above.

LUNAR CONJUNCTIONS

The best conjunctions of the Moon and the bright planets, with their positions and separations are:

03 January	Jupiter	Low in east before sunrise	1.8°
12 January	Mars	South-west in evening	5.5°
01 February	Venus	Low in south-east before sunrise	5.8°
29 March	Saturn	Low in south-east in early morning	0.9°
02 April	Venus	Low in south-east before sunrise	3.1°
20 May	Jupiter	Very low in south-east after sunset	2.9º
22 May	Saturn	Very low in south-east around midnight	1.4°
19 June	Saturn	Low in south in morning	0.9°
13 July	Jupiter	Low in south after sunset	1.3°
16 July	Saturn	Very low in south-west before sunrise	2.3°
09 August	Jupiter	Low in south-west in evening	1.6°
08 September	Jupiter	Low in south after sunset	2.3°
03 October	Jupiter	Low in south-west in evening	1.0°
05 October	Saturn	Low in south in evening	1.1°
26 October	Mars	Very low in west after sunset	3.9°
24 November	Mars	South-east before sunrise	3.6°

Lunar conjunctions, continued

28 November	Venus & Jupiter	Low in south-west after sunset	1.0 & 2.4°
29 November	Saturn	Low in south-west after sunset	2.1°
23 December	Mars	Low in south-east before sunrise	2.6°

PLANETARY CONJUNCTIONS

The best conjunctions between planets, with their positions and separations, are:

22 January	Venus and Jupiter	Morning in the east	2.5°
18 February	Venus and Saturn	Morning in the east	1.0°
10 April	Venus and Neptune	Morning in the east	0.3º
18 May	Venus and Uranus	Morning in the south-east	1.1º
18 June	Mercury and Mars	Very low in north-west after sunset	0.2º

METEORS

The **Quadrantids** will peak on the night of 03/04 January, with about 10 per hour, the Moon being quite favourable. The **Perseids** will peak on the night of 12/13 August, with some 80 per hour, but the bright Moon will affect visibility of the fainter ones. The normally richest annual shower, the **Geminids,** will peak on the night of 13/14 December, but the Full Moon will badly affect visibility. By shielding the Moon it may still be possible to see about 20 per hour.

There are, of course, minor meteor showers during the year, and sporadics may be seen at any time. For shower details see the 2019 BAA Handbook, pp99-101. More details are at https://www.imo.net/files/meteor-shower/cal2019.pdf.

COMETS

Comet 46P/Wirtanen may be a naked-eye object at the beginning of the year, fading to a binocular object in February, and still a telescopic object into March. Being in Ursa Major, it will be well-placed for observation.

Detailed comet predictions for 2019 are available on the website of the British Astronomical Association's Comet Section: http://www.ast.cam.ac.uk/~jds/preds19.pdf. Also check the Heavens-Above website (heavens-above.com) for star charts showing comet positions, and use programs such as StarryNight for detailed location charts.

THE SUN

We are now well past the maximum of the sunspot cycle in 2014, but there can still be outbursts of activity, not only of sunspots but also of coronal holes and coronal mass ejections, which can result in displays of the aurora borealis (and australis) at high latitudes. Details of sunspot numbers are at www.ips.gov.au/Solar/1/6, and real-time views of the Sun are at https://umbra.nascom.nasa.gov/newsite/images.html. Auroral alerts, with lots of other information, are at www.spaceweather.com.

EQUINOXES AND SOLSTICES

The following are the dates and times of the equinoxes and solstices in 2019:

Vernal Equinox	20 March	21.58 UT
Summer Solstice	21 June	15.54 BST
Autumnal Equinox	23 September	07.50 BST
Winter Solstice	22 December	04.19 UT

SATELLITES

The International Space Station (ISS) is regularly visible from Guernsey, looking like a very bright star crossing our skies from west to east. Also of interest are flashes from the Iridium satellites (which occur virtually every night), and periodic launches of ISS servicing craft. Many other, fainter, satellites appear every night. Details of the times and directions of visibility (together with sky charts and much more) can be obtained from www.heavens-above.com, linked from our webpage www.astronomy.org.gg/iss.htm.

WEA COURSE

The Astronomy Section's annual six-week WEA "Star Gazing" course at the Observatory will be run from 07 February to 14 March. It is usually over-subscribed, so early enrolment is recommended. See www.wea.org.gg, or telephone 237888.

OPEN DAYS

The Observatory will be open to the public again for a number of evenings during the year, including weekly openings on Thursdays during the summer school holidays (25 July to 29 August). Details will appear on our website and will be sent to the local media.

Further open days will most likely be held from 10 am to 12 noon on Bank Holiday Monday, the 27th May, to observe the Sun, during the October half-term holiday (perhaps the evening of the 31st October), and possibly on the 11th November to observe the transit of Mercury.

REFERENCES

SkyMap Pro and *Starry Night Pro* software
General: http://astropixels.com/ephemeris/astrocal/astrocal2019gmt.html
http://www.seasky.org/astronomy/astronomy-calendar-2019.html
http://www.timeanddate.com/
Lunar occultations: http://asa.usno.navy.mil/SecA/olist19.html
Mercury elongations: https://www.fourmilab.ch/images/3planets/elongation.html
Equinoxes, etc: https://greenwichmeantime.com/longest-day/equinox-solstice-2010-2019/
Planetary conjunctions: https://in-the-sky.org/article.php?term=conjunction&year=2019
Royal Astronomical Society diary, 2019
The Handbook of the British Astronomical Association, 2019

CALENDAR OF ASTRONOMICAL EVENTS IN 2019

Month	Date	Time	Event
Jan - March		All night	Comet 46P/Wirtanen
January	03	05.20 UT	Earth at perihelion (147,099,766 km)
January	03	Before sunrise	Jupiter conjunction with Moon (1.8º)
January	03/04		Quadrantid meteor shower (favourable)
January	06	Morning	Venus at greatest western elongation (47º)
January	12	Evening	Mars conjunction with Moon (5.5º)
January	20/21	2.35 – 7.49 am	Total lunar eclipse
January	21	All night	Supermoon
January	22	Morning	Venus and Jupiter conjunction (2.5º)
February	01	Morning	Saturn, Moon, Venus and Jupiter close
February	02	6.16 – 6.30 am	Saturn occultation by Moon.
February	07	19.30 UT	WEA course starts at Observatory
February	18	Morning	Venus and Saturn conjunction (1.0º)
February	19	All night	Supermoon

Month	Date	Time	Event
February	27	After sunset	Mercury at greatest eastern elongation
March	14	19.30 UT	WEA course – final class
March	20	22.00 UT	Vernal Equinox
March	21	All night	Supermoon
March	31	01.00 UT	BST starts
March	29	Morning	Saturn and Moon conjunction (0.9º)
April	02	After sunset	Venus conjunction with Moon (3.1º)
April	10	Morning	Venus and Neptune conjunction (0.3º)
April	11	Before sunrise	Mercury at greatest western elongation
May	18	Morning	Venus and Uranus conjunction (1.1º)
May	20	After sunset	Jupiter conjunction with Moon (2.9º)
May	22	Midnight	Saturn conjunction with Moon (1.4º)
May	29	All night	Ceres at opposition (magnitude 6.8)
June	10	All night	Jupiter at opposition
June	18	Evening	Mercury 0.2º above Mars
June	19	Morning	Saturn conjunction with Moon (0.9º)
June	21	16.50 BST	Summer Solstice
June	23	After sunset	Mercury at greatest eastern elongation
July	04	23.11 BST	Earth at aphelion (152,104,278 km)
July	09	All night	Saturn at opposition
July	13	After sunset	Jupiter conjunction with Moon (1.3º)
July	14	All night	Pluto at opposition (magnitude 14.2)
July	16	Before sunrise	Saturn conjunction with Moon (2.3º)
July	16/17	21.00 - 01.20 BST	Partial lunar eclipse
July	25	Evening	Observatory Open Evenings start
August	09	Evening	Jupiter conjunction with Moon (1.6º)
August	12/13		Perseid meteor shower (unfavourable)
August	09	Before sunrise	Mercury at greatest western elongation
August	29	Evening	Observatory Open Days end
September	02	Invisible	Mars at solar conjunction
September	08	After sunset	Jupiter conjunction with Moon (2.3º)
September	10	All night	Neptune at opposition (magnitude 7.8)
September	21	16.55 BST	Autumnal Equinox
October	03	Evening	Jupiter conjunction with Moon (1.0º)
October	05	Evening	Saturn conjunction with Moon (1.1º)
October	26	After sunset	Mars conjunction with Moon (3.9º)
October	28	All night	Uranus at opposition (magnitude 5.7)
October	27	02.00 BST	BST ends
October	20	After sunset	Mercury at greatest eastern elongation
November	11	12.35 - 16.30 UT	**Transit of Mercury**
November	11	All night	Vesta at opposition (magnitude 6)
November	24	Before sunrise	Mars conjunction with Moon (3.6º)
November	28	Before sunrise	Mercury at greatest western elongation
November	28	After sunset	Venus & Jupiter conjunction with Moon
November	29	After sunset	Saturn conjunction with Moon (2.1º)
December	13/14		Geminid meteor shower (unfavourable)
December	22	04.21 UT	Winter Solstice
December	23	Before sunrise	Mars conjunction with Moon (2.6º)