Sagittarius

The Newsletter of the Astronomy Section of La Société Guernesiaise

January – March 2012

Forthcoming Events

BBC Stargazing Live:

Open Evening:

Wednesday 18th January
6.30 pm at the Observatory

Television Programmes
BBC2: 16th – 18th January

WEA Course

Thursdays 8.00 pm at the Observatory

9th February – 15th March

In addition, the Section meets at the Observatory every Tuesday evening, and Friday if clear for observing.

Inside

Inserts

Star chart

Sunset, sunrise, moonset and moonrise times

Section News

This year is a remarkable milestone for the Astronomy Section, in that it marks its 40th anniversary. The Section was founded in April 1972 by David and Geoff Falla and Frank Dowding who are still members today. Plans are afoot for events to mark this anniversary and further information will be communicated in Sagittarius or elsewhere once events are confirmed.

Once again we will be organising an Open Evening which will coincide with the BBC's Stargazing Live television programmes being shown on 16-18th January. Our event will be on Wednesday 18th January at 6.30 pm at the Observatory. During 2011 we held a total of 9 Opening Evenings and 14 Group visits which provides good publicity and welcome donations but is nevertheless hard work for those concerned.

During 2011 we also had to carry out major refurbishment work to the Observatory and in particular to the Meade telescope building. The roof had been leaking for some time and badly in certain wind directions. Also the run-off structure for the sliding roof, originally constructed from greenhouse timbers was rotten at the base and needed to be replaced. Reroofing works took place in the summer masterminded by Paul Gavey and Roger Chandler with others assisting. We decided for longevity to have the run-off framework constructed from steel rather than replace the wooden structure. Fortunately we were able to obtain funding from the Societe Council and make use of a generous donation from Digimap. These works were carried out in the autumn with Paul again organising construction. We held a small reception to thank those involved with the donations and works. Hopefully we will now see a break from major works to the Observatory.

October's Sagittarius mentioned the predicted Draconid Meteor "Storm" on 8th October 2011 and despite overwhelming cloudy skies 9 members turned out at the Observatory and between gaps in the clouds just three meteors were seen.

David Le Conte managed to take some 250 pictures including the image below. The International Meteor Organisation reported that the maximum was about 300 per hour at 21.00.

Photo by David Le Conte: Draconid Meteor shower - 8th October

A reminder that subscriptions to the Section are now due and forms will be included with this edition of Sagittarius. Subscriptions remain at:

Single:	£7
Family:	£10
Student and OAP:	£4

Colin Spicer

Astronomical Events in 2012

The main highlight this year will be the Transit of Venus on 06 June, albeit incomplete. Again there should be good views of Jupiter and Saturn, and we have an opposition of Mars to look forward to. Conditions appear to be favourable for several meteor showers.

VISIBILITY OF THE PLANETS

As in 2011, **Mercury** will be poorly placed for observation from Guernsey. The best time will be early March, after sunset in the west. It will be at greatest eastern elongation (18º) on 05 March. It will be fairly good in early December in the southeast before sunrise, greatest western elongation being on 04 December. It will then be below and to the left of Venus. Other, less favourable, elongations are listed in the table at the end of this article.

Venus continues as the 'Evening Star' until mid-May, greatest eastern elongation being on 27 March. At this time it will appear as a half-moon shape in telescopes. It will reach inferior conjunction on 05/06 June, and will reappear in July as the 'Morning Star' for the rest of the year. Greatest western elongation will be on 15 August.

Transit of Venus

In 2004 we had the first opportunity in over 120 years to see a transit of Venus across the disc of the Sun, and Guernsey was in a good position to do so. We were able to observe it for about two hours before fog rolled in. Transits of Venus take place in pairs, with eight years between them, but then more than 120 years before the next pair. 2012 will, therefore, see the second of the current pair of transits, and there will not be another opportunity until 2117.

Although we had (weather permitting) a view of the entire transit in 2004, this year we will see only a short part of it. To see the whole transit it will be necessary to travel to north-west Canada, Alaska, east and north Asia, east Australia, New Zealand, or the Western Pacific Ocean.

To see the transit from Guernsey a clear, unobstructed view of the north-east horizon will be essential. The transit lasts nearly 7 hours, but we will see only the last 50 minutes of it. It actually starts at 23.03 BST on 05 June – night-time in Guernsey – so the Sun will be well below our horizon. It will not start rising until 05.05 on 06 June, by which time the transit will be almost over. The planet will appear very near the top right of the Sun, so it will be visible as soon as the Sun starts rising. Its angular diameter will be 57.8" – about 3% that of the Sun. The Sun will take 5 minutes to rise, so by 05.10 it will be completely above the horizon. Over the next half hour the planet will gradually approach the limb of the Sun. Third contact (when it appears to touch the limb) will be at 05.36. Venus will take 18 minutes to cross the Sun's limb, fourth contact

taking place at 05.54, when the Sun will still be only 5º above the horizon.

Then it will be all over until 11 December 2117. But that one will not be visible at all from Guernsey. The second one of that pair, on 08 December 2125, will be partially visible. The next one to be completely visible from Guernsey will be on 11 June 2247.

So let's just hope for clear skies for at least 50 minutes in the early morning of 06 June this year! A fuller account will be published in the next (April to June) newsletter, *Sagittarius*. In the meantime, information about the transit is available on a number of websites, including http://astro.ukho.gov.uk/nao/transit/V_2012/index.html.

A word of warning, however: observing the Sun with any optical aid is highly dangerous, unless the equipment is fitted with the necessary specialist filters. Even naked-eye observation is hazardous. I can provide filters to any member who desires them, and will give details of other safe methods of observing the event.

Mars starts the year rising at 10.00 pm in the east. It will reach opposition on 03 March, when it will be brighter than magnitude -1, at a distance of 64 million miles, and an angular diameter of 14". Not the best of oppositions by any means, but worth looking at, especially as its declination of +10º will put it at a respectable maximum altitude of 50º in Leo. It will remain visible in the evening until July.

Jupiter, which has been such a brilliant object in the last few months of 2011, will continue to be visible in the evening until April 2012. It will reappear in the eastern morning sky in July, and remains visible for the rest of the year, reaching opposition on 03 December. It should again provide good views of its moons, atmospheric bands on its disc, and the Great Red Spot. Transit, shadow and occultation events involving Jupiter's moons will be found at www.skyandtelescope.com/observing/objects/planets/3307071.html?page=2&c=y, or simulated on software such as StarryNight (www.starrynightstore.com). The transit times of the Great Red Spot can be found at www.skyandtelescope.com/observing/objects/planets/Transit_Times_of_Jupiters_Red_Spot.html. They can also be seen on StarryNight, but remember to set the Jovian System longitude to the current value (173º).

At the start of the year **Saturn** will be visible in the morning sky. It will rise earlier and earlier, reaching opposition in Virgo on 15 April. Its rings will be magnificent. It will then be seen in the evening until August. It will reappear in the morning sky at the end of November.

Uranus will be at opposition in Pisces on 29 September at magnitude 5.7. **Neptune** will be at opposition in Aquarius on 24 August at magnitude 8.

DWARF PLANETS

Pluto will reach opposition on 29 June, at magnitude 14, very close to the M25 Open Cluster in Sagittarius. Ceres will reach opposition in December, in Taurus, at magnitude 6.6, and should be easily visible in telescopes. The other three dwarf planets (Eris, Makemake and Haumea) are too faint to be seen in most amateur telescopes.

ASTEROIDS

The brightest asteroid, **Vesta**, at magnitude 6.3, will be at opposition on 19 December in Taurus. It will appear not far from Ceres, which the Dawn spacecraft will be leaving in July 2012 to continue its journey to Vesta, arriving in 2015. (For more information see http://dawn.jpl.nasa.gov/).

ECLIPSES

No eclipses will be visible from Guernsey this year, except for the tail end of a very insignificant penumbral eclipse of the Moon on 28 November. The Moon will be in the penumbral shadow of the Earth when it rises, at 16.19, and will leave the penumbra at 16.43, when it is just 4º above the horizon.

OCCULTATIONS AND CONJUNCTIONS

The Jupiter system will be occulted by the Moon on the night of 14/15 July, but only slightly. Nevertheless, this will be an interesting event, as not only the planet will be covered, but each of its moons in turn. It starts with an occultation of Europa at 02.48 BST, then Io three minutes later, at 02.51. The occultation of the planet itself starts a minute later, at 02.52, but it will take a further three minutes before the planet is completely covered by the Moon. Ganymede will be occulted at 02.58, and Callisto at 03.01.

They will re-emerge in the same order: Europa at 03.05, Io at 03.07, Jupiter at 03.08, Ganymede at 03.17, and Callisto at 03.22. The Moon will be a slender crescent, and Jupiter and its moons will be covered close to the upper cusp, re-emerging on the dark side of the Moon. This will be a good photo opportunity, provided it is sufficiently visible, as its altitude will be only 5º in the north-east.

Mercury will be occulted by the Moon on 14 November, after the Sun has risen. It starts at 09.26, when Mercury will be 9º altitude in the south-east., and Mercury will re-emerge at 10.06. It is unlikely, however, that this will be visible, given the daylight and the fact that Mercury will be dim, at magnitude 3.

The following are the dates of planetary conjunctions, 3º or closer:

10 February	Venus and Uranus (0.6º)
13/14 March	Venus and Jupiter (3º)
01 June	Mercury and Venus (0.1º)
15 August	Saturn and Mars (2½º)
28 November	Venus and Saturn (<1º)

METEORS

The **Quadrantids** with up to 80 per hour, peak on the night of 03/04 January. The **Perseids** peak on the night of 11/12 August. The **Leonids** peak on 17/18 November. The Moon will not interfere much with any of these showers this year. The richest annual shower, the **Geminids**, with the possibility of over 100 per hour, peaks on 13 December, and coincides with the New Moon, so conditions are very favourable.

COMETS

We have had good views of Comet **Garradd** (2009 P1) in the last few months of 2011, and these should continue in the first couple of months of 2012, with the comet appearing at magnitude 7 in Hercules.

Another good one is Comet **Levy** (2006 T1), which will reach perihelion in January 2012, also at magnitude 7.

Comet predictions for 2012 are available at the excellent website of the British Astronomical Association's Comet Section (www.ast.cam.ac.uk/~jds/preds12.pdf) .

Check the www.heavens-above.com website for star charts showing comet positions.

THE SUN

We are now rapidly approaching solar maximum, with increasing frequency of sunspots and auroral displays at high latitudes. During 2012 the sunspot number is predicted to increase from 73 to the maximum of 90 by December. Details are at www.ips.gov.au/Solar/1/6. Who knows, we might even see some aurorae from Guernsey.

EQUINOXES AND SOLSTICES

The following are the dates and times of the equinoxes and solstices in 2011:

Vernal Equinox	20 March	05.14 UT
Summer Solstice	21 June	00.08 BST
Autumnal Equinox	22 September	15.48 BST
Winter Solstice	21 December	11.11 UT

SATELLITES

The International Space Station is regularly visible from Guernsey. Also of interest are flashes from the Iridium satellites, and periodic launches of the Space Shuttle. 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 the www.heavens-above.com website.

WEA COURSE

The Astronomy Section is again running the annual six-week WEA "Star Gazing" course at the Observatory in February and March, starting on 09 February. However, it is again full, and, as usual, there is a lengthy waiting list. Enrolment for the

2012 course starts in August. See www.wea.org.gg or telephone WEA Guernsey at 237888.

OPEN DAYS

The Observatory will be open to the public again for a number of Thursday evenings during the year, including weekly openings during the summer holidays (26 July to 30 August). Details will appear in the Astronomy Section newsletters, on the website, and in local media.

David Le Conte

References

SkyMap Pro and *Starry Night Pro* software
RAS diary 2012
www.astronomia.org/2012/fenogeoc.en.html
http://astro.ukho.gov.uk/nao/transit/

CALENDAR OF ASTRONOMICAL EVENTS

Month	Date	Time	Event
Jan			Comet Levy at perihelion
Jan - Feb			Comet Garradd visible
Jan-Apr		Evening	Jupiter visible
Jan-May		Evening	Venus visible
Jan - Jul		Evening	Mars visible
Jan-August		Morning – Evening	Saturn visible
January	03/04		Quadrantid meteor shower
February	09	20.00 UT	WEA course starts
February	10	Evening	Uranus close to Venus
March	03	All night	Mars at opposition
March	05	After sunset	Mercury at greatest eastern elongation
March	13/14	Evening	Venus close to Jupiter
March	15	20.00 UT	WEA course – final class
March	20	05.14 UT	Vernal Equinox
March	25	01.00 UT	BST starts
March	27	Evening	Venus at greatest eastern elongation
April	15	All night	Saturn at opposition
April	18	Before sunrise	Mercury at greatest western elongation
June	01	Evening	Mercury close to Venus
June	05		Venus at inferior conjunction
June	**06**	**Early morning**	**Transit of Venus**
June	21	00.16 BST	Summer Solstice
June	29	All night	Pluto at opposition
July – Dec		Morning - Evening	Jupiter visible
July	01	After sunset	Mercury at greatest eastern elongation
July	26	Evening	Observatory Open Days start
August	11/12		Perseid meteor shower
August	15	Evening	Mars close to Saturn
August	15	Morning	Venus at greatest western elongation
August	16	Before sunrise	Mercury at greatest western elongation
August	24	All night	Neptune at opposition
August	30	Evening	Observatory Open Days end
September	22	15.48 BST	Autumnal Equinox

September	29	All night	Uranus at opposition
October	26	After sunset	Mercury at greatest eastern elongation
October	28	2.00 am	BST ends
Nov - Dec		Morning	Saturn visible
November	16/17		Leonid meteor shower
November	28	Morning	Saturn close to Venus
November	28	Evening	Penumbral eclipse of the Moon
December	03	All night	Jupiter at opposition
December	05	Before sunrise	Mercury at greatest western elongation
December	13		Geminid meteor shower (very favourable)
December	19		Vesta at opposition
December	21	11.11 UT	Winter Solstice

Planetary Effects and Electrical Links with the Sun.

Recently obtained information, in particular that gained from spacecraft missions, is helping to provide confirmation of planetary links involving magnetic disturbances, with surprising links between planets and their moons. With earlier research findings, including observations from Earth orbiting satellites, there is also reported to be further evidence of electrical effects linked with the Sun.

In the middle of the past century, research results were published on the subject of radio reception interference. In this research study by the Radio Corporation of America,(RCA) in 1951, it was reported that particular positions or alignments of planets in their orbits around the Sun seemed to be linked with magnetic disturbances, and with effects noted on short wave radio reception.

For a statistical analysis of this apparent link, RCA asked several astronomers if they could assist with a more complete study of this finding by carrying out further investigation work. All of the astronomers refused this request, because the idea that planetary positions could affect radio waves seemed to be not worth investigating. However, an experienced electronic and radio engineer, John H. Nelson, was found who agreed to carry out this further investigation. The first part of this study was to check the records of radio disturbances dating back to the 1920s. As a result of this work, together with further analysis, it was found that magnetic storms causing the radio disturbances occurred when two or more planets were at opposite positions in their orbits, or close together at right angles. Short wave radio reception was found to be good when planets were in other positions, and the engineer's predictions of magnetic disturbances in this way were found to be more than ninety per cent accurate.

More definite evidence, and of effects linked with the Sun, came with the launch of satellites and spacecraft. During the 1960s and 1970s satellites

in orbit above the polar regions mapped a surprising movement of ions, confirming that electric currents were present in these areas. This was at first attributed to Earth's magnetotail being affected by the 'solar wind', but spacecraft later also found electric fields above the auroras, following the magnetic field lines. This confirmed the claim by the Norwegian physicist Kristian Birkeland, from his work in the 19th century, that there was a larger electrical circuit between the Earth and the Sun. Magnetic fields are created by electric currents, and Birkeland discovered that an aurora is caused by electrical interactions linked with the Sun. These findings were from the first magnetic field measurements in the polar regions, which he had obtained during expeditions in 1889 - 1890, also linking these measurements with appearances of the aurora, and suggesting that this effect was produced by charged particles from the Sun being guided around the Pole by Earth's magnetic field. It was also found that at the time of an aurora, there were magnetic field variations affecting compasses.

The solar wind is a stream of electrically charged particles from the Sun, and there has been recent confirmation from satellite observations in detecting the movement of electrons in the opposite direction, from the Earth towards the Sun. This unexpected electrical exchange has also been confirmed in the case of Jupiter, with electrons again found to be moving towards the Sun, and with this process also involving Jupiter's volcanic moon Io. In 2011, a funneling of electrical currents between Saturn's icy moon Enceladus and the polar regions of Saturn was detected by the Cassini spacecraft mission's plasma spectrometer, and with the observation of an auroral glow effect on Saturn.

In a comment on this announcement of an electrical current in a magnetic loop between Saturn and its moon Enceladus, and following the similar finding with Jupiter and its moon Io, Professor Andrew Coates, head of planetary sciences at the U.K's Mullard Space Science Laboratory, stated that this now looked like a universal process, as reported briefly in the astronomy magazine Astronomy Now - June 2011 issue.

The present situation seems to have been anticipated by the electrical pioneer Ralph Juergens, with his consideration of electricity in relation to the Sun, and the Nobel Prize winner Hannes Alfven with his understanding of the part played by electric and magnetic fields in plasma.

The recent discoveries provide further confirmation relating to electrical currents being present within the solar system. Evidence, however, for this wider presence of electricity - beyond our own planet and its atmosphere, seems until recently to have remained largely omitted from any articles or books published on the subject of astronomy.

(Professor Andrew Coates of the

Mullard Space Science Laboratory, as mentioned in this article, was in Sark over the weekend of October 21st-23rd, 2011, to open the island's inaugural Star fest event.. This was organized by the Sark Astronomical Sociey, and Professor Coates gave two talks on the exploration of the solar system during the event.)

Geoff Falla

References

Nature, April 21, 2011.
Astronomy Now, June 2011.
Nexus, Vol 18, No 5, August-September 2011.
The Electric Universe. W.Thornhill and D.Talbott. (Mikamar Publishing, Portland, Oregon, 2007)
World Famous Strange but True. Edited by Colin Wilson with Dr.Christopher Evans. (Parragon Books edition, 1995)
Radio Corporation of America, RCA Review, March 1951.

Geoff Falla's regular roundup of articles from popular Astronomy and Space Journals

Unlocking Jupiter's Secrets. NASA's Juno spacecraft was launched in August on a four year journey to study Jupiter in more detail than has been possible previously. Images of the planet's atmosphere are to be obtained with optical and infrared cameras, and the properties of its mass and structure will be found by measuring its gravity field. (Sky and Telescope, September 2011)

Fighting for Dark Skies. The battle to control light pollution, with the growth of urban areas and lighting. Many communities are finding ways of reducing energy use, and for astronomy any lighting should be reduced wherever possible. The International Dark Sky Association's campaign is achieving good results, and in January 2011 the island of Sark achieved recognition as Europe's first International Dark Sky Community. (Sky and Telescope, September 2011)

Water in the Universe. It is now known that water or ice also exists on many other planets and moons in our solar system, as well as in comets and in deep space gas clouds with evidence of planet formation.
(Astronomy Now, October 2011)

Gamma Ray Bursts. A set of articles focusing on solving the mystery of these energy bursts. The powerful bursts of radiation from far distant sources were linked conclusively with supernova explosions in 2003, but the huge amount of energy being emitted was still difficult to explain, before being found to involve black holes and directional jets.
(Astronomy Now, October 2011)

Super-Charged Supernovae. A typical supernova involves the core collapse of a massive star, brightening as it expands explosively, but recent discoveries of far more luminous supernovae have taken astronomers by surprise, requiring new explanations for these more extreme events.

(Sky and Telescope, October 2011)

What Triggered the Big Bang? What, if anything, came before the Big Bang, and what caused the sudden expansion to form the universe as we know it? Cosmology has now moved towards theories involving a 'multiverse', and with our galaxy being formed as a result of a collision with another universe, but it will be a long time before anything is known with any certainty. (Astronomy, October 2011)

Comets - Key to the Solar System's Past. Comets preserve a record of conditions which existed when the planets were formed. It is now possible for comets to be studied by sending space missions out to them, and much has been learned in recent years as a result of four very successful missions already achieved. (Astronomy, October 2011.)

The 100 Greatest Pictures of the Year. A selection of the best astronomy and space research photos of the year, many never published before, from space shuttle and solar system images to deep space images of galaxies and nebulae. (Astronomy, November 2011)

The Herschel Infrared Telescope. A set of articles focusing on the largest space telescope ever launched. It is the first space observatory to cover the whole range of long wavelength radiation sources, from planetary surfaces and atmospheres to star-forming regions of gas and dust, specialising also in understanding more about the formation and evolution of galaxies. (Astronomy Now, November 2011)

Neutrinos - Faster than Light Particles? Neutrino particles are very difficult to detect because they rarely interact with other matter. A recent remarkable claim is that scientists have now detected neutrinos which are recorded as having travelled faster than the speed of light. If confirmed by further experiments, this would be in conflict with established theory. (Astronomy Now, November 2011)

Observing Guides for 2012. An annual magazine guide for visual and telescopic observing, from the natural phenomena of our own planet to observation of the moon, planets, and deep sky objects through the seasons, with a summary of the best sky events of the year. (Skywatch 2012 - Sky and Telescope Special Issue)

In Search of the Aurora. The different kinds of aurora to be seen, why they are now increasing in frequency, and the best places in more northern latitudes to view this spectacular phenomenon. (Sky at Night, November 2011)

New Worlds. A set of articles on the increasing discovery of exoplanets, those found in orbit around other stars. With the current Kepler space mission finding firm evidence of planets in transit across other stars, the number of exoplanets is already around 700 in total. Many of these are gas giant planets in close orbits, but how many of the planets may be more Earth-like?

The Sun may occupy a special place in our galaxy, and what does it need for a planet to be truly habitable for life as we know it? (Astronomy Now, December 2011.)

The New Mars Rover Curiosity. The new Mars Science Laboratory vehicle is much heavier than those used in previous missions, with instruments to detect water and signs for life in the past or present. Plans for the Rover Curiosity mission, which was launched in November 2011 and is due to land close to the Martian equator in August 2012. (Astronomy Now, December 2011)

Secrets of the Moon. Recent surveys of the Moon's surface, including analysis of the materials produced by a lunar impact mission, together with a NASA spacecraft's Moon Mineralogy survey, have revealed that the Moon's surface contains significant amounts of water, particularly in permanently shadowed polar craters. (Sky at Night, December 2011)

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