

SPACEWATCH

the newsletter of the Abingdon Astronomical Society

Next Talk
13th November 2017
Ptolemy instrument on Rosetta
Dr Simon Sheridan
Open University

EDITORIAL

Well the autumn did not start well from the point of view of observing. I was glad to see however that the first observing session of the season did get a clear night. Unfortunately, I could not be there as I was at the major UK star party at Kelling Heath in Norfolk. I apologise for there being few images this month but due to space constraints I could not fit them all in. As always, we have a plea for more after tea speakers. If you have anything you would like to talk about then please see Chairman Clifford.



M51 – Steve Creasy – reprocessed image

THE NIGHT SKY THIS MONTH

by **Bob Dryden**

Mercury: Having moved through Superior Conjunction on the 8th October, Mercury enters the evening sky. However, it is never more than 2° above the horizon at sunset which means it is invisible throughout this session.

Venus: At -3.9 magnitude it is not hard to see Venus in the sky just before dawn. On 9th October the planet rises about 2 hours before the Sun and is 20° high by sunrise. The solar elongation is 24° at this time, but this is decreasing and reaches 14° by mid-November. The phase is 0.9%, which means the disc is a fat gibbous shape in the telescope. By mid-November Venus is 10° above the horizon at sunrise, having risen just one hour earlier.

As this session starts on 9th October Venus is approximately 2° below Mars, but this is the closest they will be as they are now

moving apart. On the morning of 18th October the crescent Moon will be 3° below Venus. Jupiter and Venus are moving closer together in November. By 9th November they are 3° apart, and are at their closest on 13th November when they will be just 0.5° from each other which will be quite spectacular.

Mars: Mars is visible in the morning sky in the constellation of Leo. On 9th October it rises about 2 hours before the Sun and reaches an altitude of 20° by sunrise. Shining at +1.8 magnitude Mars is not very bright but still a naked eye object. The red planet moves in to Virgo on 13th October. By mid-November Mars reaches a height of 27° by sunrise and is appearing above the horizon a good 3 hours before the Sun.

On the morning of 17th October the crescent Moon is 2° above Mars,

Jupiter: Jupiter is in conjunction with the Sun on 26th October which means you will not be able to see for most of this session. By the end of the first week of November Jupiter will be rising just under an hour before the Sun and as it is bright (at -1.7 magnitude) you may be able to find it. If you really miss it try looking in the SOHO images for it.

Saturn: To be found in the constellation of Ophiuchus, Saturn is shining at +0.5 magnitude low down towards the south at sunset in mid-October. You will have about 2 hours before the planet sets in which to point your telescope at it to view the rings. They are at an angle of 27° which makes them easily visible in a small telescope. By mid-November Saturn is just 11° high at sunset and sets about 90 minutes after the Sun so this session is your last to have a look at the planet for this apparition.

On 24th October the crescent Moon is approximately 4° above Saturn.

Uranus & Neptune: Uranus reaches opposition on 19th October which means it is visible just about all night for most of this session. Shining at +5.7 magnitude, Uranus is in the constellation of Pisces and culminates at a height of 48°.

Neptune is in Aquarius and culminates lower down at 30° above the southern horizon. As this session starts on 9th October Neptune is 10° high at sunset, culminates 4 hours later and sets about 04.00 UT. By mid-November, it is already 20° high in the south east at sunset, and sets in the south west just after midnight.

Meteors: There are two meteor showers active this session, the Orionids and the Taurids.

Orionid meteors can be seen between 16th and 30th October, with the maximum occurring over the period 21st to 23rd. The hourly rate at maximum is 25 and the meteors are generally very fast moving. The Moon on 22nd October is just a 3 day old crescent so presents no problem at all.

Unlike the Orionids which last just 15 days, the Taurid meteor shower goes on for over a month. Visible between 20th October and 30th November the Taurid meteors are often slow moving and very bright which helps to make up the fact that there are not many of them an hour. The hourly rate is only 10 at very best but because they are bright, you often notice them even if not actually looking for Taurid meteors. This shower has two maximums, one on 5th November and the other on the 12th. On the 5th the Moon is at Full phase so will interfere a lot with any observations. By the 12th, the Moon rises about midnight and has reached Last Quarter so will still hinder observations in the early morning somewhat.

Occultations: The night of 5th/6th November sees a Full Moon pass through Taurus and occult two bright stars as it does so. At 19.47 UT +3.7 magnitude Gamma Taurus is 15° above the eastern horizon as it is covered by the Moon.

A much more interesting occultation takes place at 02.39 UT. That is when the bright star, +0.9 magnitude Aldebaran is occulted. At 03.24 UT Aldebaran reappears from behind the Moon. The Moon will be 52° high towards the south at the time of the stars disappearance and 45° high by the time of its reappearance.

On 7th November at 00.22 UT the +4.3 magnitude 119 Taurus reappears from behind the Moon, which will be 50° high in the south east.

Finally, on 13th November at 01.35 UT +4.1 magnitude Sigma Leo reappears from behind the Moon. This will be a tough observation to make as the crescent Moon will be just 3° above the eastern horizon at the time.

Asteroids: There are four asteroids/dwarf planets brighter than 10th magnitudes on view this session. The dwarf planet 1 Ceres brightens slightly, going from +8.7 to +8.4 magnitude as it crosses the constellation of Cancer.

2 Pallas is +8.3/+8.2 magnitude (which is the brightest it gets this apparition) and is in Eridanus until 29th October when it moves in to Fornax.

7 Iris is found in Aries. It starts at +7.4 magnitude and reaches +6.9 magnitude by mid-November which, again, is the highest magnitude it will reach this apparition.

8 Flora is fainter, starting at +10 magnitude and reaching +9.3 magnitude by November. Flora will continue to get brighter throughout the rest of this year. You will find this one in Gemini.

Comets: There is one comet worth mentioning this time, and that is comet C/2017 O2 ASSAS-SN. Found many months ago by an automated search telescope, this comet should be faint and difficult to see. However, as is the way with comets, it has not followed predictions and is much brighter than expected. Obviously it has had an outburst of some kind so it is impossible to say how long it will stay bright so you will just have to go out and have a look in your telescope to see if you can see it or not.

Currently in Perseus, it moves in to Camelopardalis on 16th October which means it is circumpolar (i.e. visible all night). Hopefully, it is around 8th or 9th magnitude so you will need a small telescope or big binoculars. Look when there is not a bright Moon about, otherwise it will be impossible to see it.

(I have been following this comet and it has been very diffuse and not so easy to see, even in the 22. It does however seem to be a very gassy comet so it may respond well to a Swan band filter. It will also be best to try and pick it up when high in the sky – Ed)

LAST MONTH'S TALK

by Gwyneth Hueter

September's talk

Patrick Irwin is Professor of Planetary Physics at Oxford, and has a particular interest in gas like planets and exoplanets and the atmospheres thereof. He was involved with some of the Venus Express, Rosetta and Cassini equipment. He started off as a member of Bath AS and now asks how we can detect life on exoplanets.

Before 1995 the only planets we knew were those in our solar system, i.e., the terrestrial ones and the gas giants. Then along came the discovery of 51 Pegasi b, which I found out is a hot Jupiter with a two day orbit. We discovered it by the radial velocity of the spectral lines on the star; the planet is making its star wobble so the spectral lines keep shifting as the pair orbit around the system's centre of gravity. (Hot Jupiter's are large gas giants orbiting very close to their parent stars. If you've attended some of our previous talks on exoplanets you will know that these planets' orbits are decreasing and sending the planets into certain doom.)

Transit spotting is a stock method for detecting exoplanets because they are so much fainter than their parent star. Unfortunately the orbital orientation can't be ascertained. That can only be done if we can actually see the planet transiting the star. If you get a dip in the star's light then you can assume a planet is transiting, and if the orbit is just off horizontal to us then you get a mini dip when the planet going behind its star. I loved his demonstration with a golf ball and a football stuck on either end of a stick hanging from a string. He also showed us the best picture I've ever seen of Venus in transit.

There are also two ground based observatories that can do direct imaging of exoplanets by using a coronagraph, which is a way of blocking out the parent star's light so the exoplanet becomes easier to see. Gravitational lensing can also reveal a double image of a star passing behind a darker star. When the two stars are in a line of sight the gravity of the front star bends the light coming from the star behind it. If the star has a planet you get a double spike in the two light curves of the star. Of course this is just a one off, line of sight, event. Mind you, 25 exoplanets have been observed using this microlensing effect, as it is called.

But, really that's a tiny proportion of the 2950 exoplanets that have already been confirmed, and the unconfirmed 2505 possibilities from the Kepler data. Prof Irwin concludes that almost any population II stars (metal rich, second generation stars) have planets, including hot Jupiter's and Earth sized.

As regards finding planets that may harbour life, we need to look at exoplanets in the 'Goldilocks zone', as it is

called, where liquid water can exist on the surface. This depends on the planet's distance from its star and the temperature of the star. Mind you in theory it seems that Venus and Mars are supposed to be suitable in our Solar system.

Transit observations give us the most data. Prof Irwin did not go into detail about the equipment involved but then we have had previous speakers talk about exoplanet searches. Kepler is still in space in an earth trailing orbit, although its pointing has been compromised. It has been observing a patch of sky in Cygnus and in spite of only managing three years of its intended 10 years of data gathering it is still providing information. The instrument is a Schmidt plate camera with a 55 inch primary.

Pictures can be taken at different wavelengths Red gives shallow readings, whilst green and blue go deeper into the atmosphere so you can get better absorption readings of the planet's atmosphere. Different gases have different absorption signatures such as Methane, Ozone and Carbon Dioxide

An exoplanet can also exhibit a change in light as its phase changes, so it is higher as the star moves behind it. Even thermal emissions can be detected.

Our Earth's atmosphere does not have a uniform depth; the ozone holes and oxygen are not permanent and need to be constantly replenished. They are clear signs of life. Intriguingly, the temperature of the carbon dioxide in our upper atmosphere is warmer over Antarctica than elsewhere.

Prof Irwin gave us a review of the Cassini-Huygens mission and the equipment he was involved with. It is still the largest ever interplanetary craft that we have launched. He was involved with CIRS (Composite Infra-Red Spectrometer), which operated at long IR wavelengths and had to be cooled to 80 kelvin. It was pointed at Saturn and had a black shield which radiated heat into space. He brought in a model of the instrument, with its tiny germanium lens and hollow titanium legs, also tiny and quite fragile. It had to be flight tested so that it could survive two years of travel with its protective cover on before it could be deployed. He said the shake test involved standing it on a large woofer.

In July of 2004 the Cassini-Huygens probe was sent on lots of elliptical orbits round Saturn and observed lots of swirly bits along belt zone boundaries. He got quite excited about them and still does not know why these swirly bits exist. He had also noted how the rings appear bent as they go behind Saturn but concludes Saturn has an atmosphere which bends their light.

He was also involved with VIMS (Visible and Infra-red Mapping Spectrometer), which looked deep into Titan's atmosphere, wavelength around five microns. It also revealed lots of structure in Saturn's atmosphere, even more than in Jupiter. The rings' reflections on the surface and backlighting from the rings is exquisite. Internal heating is detected.

Titan's clouds have a visible orange smog but near IR shows deeper methane clouds and a methane rain (hydrological) cycle.

CIRS took spectrum readings of Titan, and took temperature readings at different heights and latitudes.

The hexagon shaped vortex on the north pole of Saturn was actually detected by Voyager two, but the image was confusing at the time. It is very clear at five microns and backlit. A big storm in June 2011 recorded the hottest temperature at the uppermost part of Saturn, visible in a colourful swirl.

Prof Irwin's final thoughts were on the future of ground based telescopes as well as the space based scopes such as the JWST.

FURTHER DISCUSSION

Why not take a look at our website? It's at: www.abingdonastro.org.uk.

If you are not already on our internet mailing list, then why not log on to YahooGroups. The list is called 'abingdonas'. Members use the list to alert each other about celestial events and to chat about amateur astronomy. The list is quite active, with several messages most weeks. To read through previous messages click on:

<http://groups.yahoo.com/group/abingdonas/>.

To join the abingdonas list, please go to <http://www.yahogroups.com>. You can also unsubscribe from the list here.

To post messages to the list, please send them to abingdonas@yahogroups.com. Please note that you will need to sign up with a YahooID if you do not already have one. You can do this on the above page.

Further information about the mailing list can be found on the abingdonas webpage at :

<http://groups.yahoo.com/group/abingdonas/>.

DATES FOR YOUR DIARY

23rd October 8pm Beginners' Meeting in the Main Hall., talks to Cleaning your optics, Lunar Libration and Gravitational lenses

Observing evening: The next observing evening will be FCN 16th-18th Oct 2017 at Frilford Heath Golf driving range. Contact Trevor Pitt or Steve Creasey for details.

International Astronomy Show 13-14th October at Stoneleigh Park Warwickshire. For details see <http://www.ukastroshow.com/>

The editor of "SpaceWatch" is Owen Brazell, who would very much appreciate your stories & contributions. In particular whilst many fine images are being posted on the discussion group it would be nice to have some in the SpaceWatch. Please send any news, observations, photos, etc. to:

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