SPACEWATCH
the newsletter of the Abingdon Astronomical Society

12th September 2011

Dr Mike Leggett
(Milton Keynes Astronomical Society)
'Exploration of Saturn'

Welcome back! I hope you all had a pleasant summer break. We have a good programme of speaker meetings for you this season, together with Beginners' Meetings and Observing Evenings, weather permitting of course.

THE NIGHT SKY THIS MONTH

by Bob Dryden

Sun: On 23rd September, at 09.05 UT, the Sun crosses the celestial equator heading south. More commonly described as the autumn equinox, this signals the moment when the days become shorter than the night.

Mercury: Coming to the end of a good morning apparition, Mercury will be just about visible for the next few days before it disappears back into the Suns glare. Although at a bright magnitude -1.0, the planet will be very low down in the bright morning twilight so will be a hard object to find. By about the 16th/17th September it will gone. Superior conjunction with the Sun occurs on 28th September after which Mercury will reappear in the evening sky. However it will not really be visible until well into October as it stays very close to the western horizon.

Venus: Following its August conjunction with the Sun, Venus slowly moves into the evening sky. However, despite its extremely bright magnitude -3.8 Venus also hugs the horizon and will be hard to see. Even by mid October Venus will be barely 4° above the horizon as the Sun sets. Things will improve as we move towards Christmas.

Mars: Mars is currently residing in the constellation of Gemini, but crosses into Cancer during the third week of September. This means the planet is visible against a dark sky for a couple of hours at a reasonably decent height. In fact, Mars moves rapidly enough amongst the stars that it actually rises above the horizon at virtually the same time right through this session – that is about 01.30 BST. So by the time the Sun appears, Mars is a good 50° high. Unfortunately, Mars is physically a long way away from Earth at the moment so the apparent size of the disc is rather small – it is beginning to increase though. In September the disc is 4.8″, while during October it increases to 5.4″. Traditionally, 5″ was considered the point at which details on the surface became visible (of course, modern CCD's have meant imagers can record detail most of the time) so the visual observing season on Mars can begin. From 30th September to 2nd October Mars crosses the open cluster M44 (commonly called The Beehive). This should present some nice opportunities for imagers and photographers as well as pleasing views for visual observers. All you will need is a pair of binoculars. Mars will be shining at magnitude +1.3 so will be an easy naked eye object. However, if you are having trouble finding it, on the morning of 23rd September the crescent Moon will be close by. Mars will be the 'star' just above and to the left of the Moon.

Jupiter: It is hard to miss Jupiter as it rises in the east, shining at a brilliant magnitude -2.8. Currently in Aries, and approaching opposition (29th October), Jupiter rises about 21.00 BST in mid September, and two hours earlier by mid October. Of course, the best telescopic views will not be until the planet gains altitude (around midnight) but you should still be able to see the cloud markings on the disc and watch the four bright satellites before then.

Saturn: Sadly, Saturn is too close to the Sun to be seen this session.

Uranus + Neptune: Uranus reaches opposition on 26th September which means it will be visible all night. Shining at magnitude +5.7 in Pisces, Uranus is an easy binocular target if you have a finder chart. The later in the night you look, the higher the planet will be ((ultimately reaching about 38° when it culminates in the south).
Neptune is already past opposition so culminates in the south (at about 25°) earlier than Uranus. Also, being slightly fainter at magnitude +7.8, means binoculars will still be all you need to see it but it will be a harder target to find.

Meteors: While there are no major meteor showers this session, there might be an outburst of a normally very minor shower. The Draconids are active from 6th to 10 October and usually have an hourly rate of just one or two meteors an hour. However, every so often the Earth moves through a thicker part of the meteor stream and we get a short, but active display. This year might be one of those years. If it happens, the predictions are it will be between 16.00 and 22.00 UT on the evening of 8th October. How many meteors an hour you will see is anyone's guess. In 1933 and 1946 there were thousands an hour. In 1998 and 2005, it was more like a couple of hundred an hour. So the only way to find out how many there will be is to go out and look. The radiant (the point in the sky from which the meteors seem to appear) is near the head of Draco. There is one rather big fly in the ointment however, and that is the Moon. That night there will be an 11 day old Moon in Aquarius, and it does not set until 03.30 BST. This will probably drown out any fainter meteors, but if the shower is very active, the chances are you will still see quite a few meteors. Only by getting out there and watching will you know how active the shower will be this year. Incidentally, the period of high activity is usually very short – usually barely an hour, and sometimes considerably less.

Asteroids: A bright asteroid on view this session is technically not an asteroid but a dwarf planet (although for decades it was classed as an asteroid). 1Ceres starts September at magnitude +7.6 but is now fading, and drops to magnitude +8.0 by mid October. Currently in Cetus, Ceres crosses into Aquarius in the third week of September.

4 Vesta is past its best now but still easy to see in binoculars at magnitude +6.5. As it crosses Capricornus, it fades to magnitude +7.2 by mid October.

15 Eunomia is in southern Perseus and is beginning to brighten. Currently at magnitude +9.1, it reaches magnitude +8.7 in October.

Occultations: While there are no occultations of bright stars this session, there is an interesting grazing occultation. The magnitude +5.8 star, 40 Aries, grazes the southern limb of the Moon on the morning of 17th September. The graze line extends across the country, passing north of Swindon and through Oxford. If it is clear, the graze will happen between 03.41 and 03.53 BST.
You will need a telescope to see this one as the Moon will be gibbous, and so quite bright. The Moon will be about 55° high in the south at the time.

Comets: There are three comets on view this session that could be interesting.

The first is 2009 P1 Garradd which is currently visible in binoculars. It will be around magnitude 7.5/8.0 as it moves amongst the stars of Hercules. This means it will be high in a dark sky (wait until the Moon is absent from the sky), and visible at a very sociable hour (ie: early evening). The comet should continue to brighten right through the rest of this year.

At a more unsociable hour we have 4PP Honda-Mrkos-Pajdusakova which is Leo (and so is visible just before dawn) Rising to magnitude +6.3 in late September, it begins to fade slightly (to mag. +7.3) into October. However, the comet will be close to the Sun through September making it a difficult object to find. It is slightly more favourable in October but the comet is moving south quite rapidly so there will be a small window of opportunity to see it.

The third comet to mention might not be there at all. Comet C/2010 X1 Elenin should be starting to brighten (even reaching 6th magnitude according to predictions) now as it moves from Virgo into Leo. The problem with all these predictions is that the comet now appears to be breaking up. This does happen occasionally to comets, and the likely result of Elenin doing it is that it will not become as bright as we had hoped (or might even just disappear altogether). Once a comet disintegrates, no-one can predict how bright the pieces may get, or even if they will break up as well, so you just have to keep watch and wait to see what will happen. Watch this space!!

MOON PHASES:

Full: 12th Sept.; Last Qtr: 20th Sept.; New: 27th Sept.; First Qtr: 4th Oct.; Full: 12th Oct.

LAST MEETING'S TALK

by Gwyneth Hueter

Stephen Johnston, of the Museum of the History of Science, Oxford, gave an illuminating talk on 'Astrolabes East and West'

Astrolabes (literally 'stargrabbers') are the precursors of today's planispheres, and the Museum of the History of Science has 165 of them, the largest collection in the world. They began to take shape in Greek antiquity, 2000 years ago, but really took off with the Arabs around the end of the first millennium as the Arabs became more interested in science.

Astrolabes usually consist of a disc with calendar and zodiac on the back and a plate with a rotatable network/stencil (rete) showing major stars, the ecliptic and the visible horizon for a certain latitude. You can work out the time by lining up a star in two view holes on a beam (alidade) crossing the plate on the back then refer to the front of the plate and match up the tilt of the beam, using another alidade crossing the front of the plate. Rather confusing, so thank heavens we have planispheres now.

Even more confusing is the bewildering variety of astrolabes in the Museum collection. They are all handcrafted (the only mass produced ones are usually fake Persian ones, so there is clearly still a market for them).

Good astrolabes usually have several plates for differing latitudes. A 17th century Indian one had seven interchangeable plates for 18° up to 90° north. (made by someone with a sense of humour, obviously) A North African one from the late 19th century had been made from a pre-used piece of metal. A Moroccan one from 1773/4 has curved lines which enables the user to find the direction of Mecca.

One in Nuremberg from 1542 is made of paper pasted onto wood.

The earliest English ones are from the mid 14th century. One from Merton College around 1350 is a foot wide and made of thin metal, possibly made for an Oxford scholar and used for teaching. The date ties in well with Chaucer's short 'Treatise on the Astrolabe', which he wrote for his young son shortly after. I have it on good faith that that is still one of the best instruction manuals on the astrolabe that you will find.

Other oddities that Mr Johnston enthused about were a clockwork astrolabe from Nuremberg (1686), an Iranian one with a geared mechanism on the back, showing the phases of the Moon, and a spherical one, eastern Islamic, around 1480. The only one known, about the size of an orange, and it's in Oxford! There is also a linear one, but how to use it is not fully understood.

I have looked at the Museum of Science Oxford's website and there are pictures of all the astrolabes in the collection. The strangest one is surely the linear one, which looks like a spear with three plumblines. If you google Keith's java Astrolabe, he has a live astrolabe on screen, set to actual time.

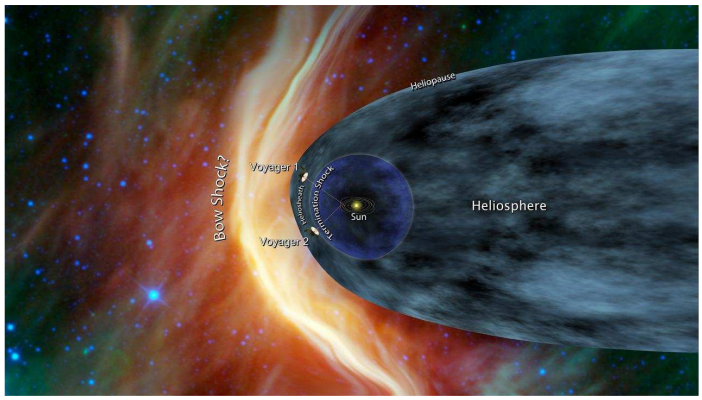
SOLAR SYSTEM SIZE SURPRISE

by Dr Tony Phillips

News flash: You may be closer to interstellar space than you previously thought.

A team of researchers led by Tom Krimigis of the Johns Hopkins University Applied Physics Laboratory announced the finding in the June 2011 issue of *Nature*. The complicated title of their article, "Zero outward flow velocity for plasma in a heliosheath transition layer," belies a simple conclusion: The solar system appears to be a billion or more kilometres smaller than earlier estimates.

The recalculation is prompted by data from NASA's Voyager 1 probe, now 18 billion kilometres from Earth. Voyagers 1 and 2 were designed and built and are managed by NASA's Jet Propulsion Laboratory. Aging but active, the spacecraft have been traveling toward the stars since 1977 on a heroic mission to leave the solar system and find out what lies beyond.



This artist's concept shows NASA's two Voyager spacecraft exploring a turbulent region of space known as the heliosheath, the outer shell of the bubble of charged particles around our sun. Image credit: NASA/JPL-Caltech.

To accomplish their task, the Voyagers must penetrate the outer walls of the heliosphere, a great bubble of plasma and magnetism blown in space by the solar wind. The heliosphere is so big, it contains all the planets, comets, and asteroids that orbit the sun. Indeed many astronomers hold that the heliosphere defines the boundaries of the solar system. Inside it is "home." Outside lies the Milky Way. For 30+ years, the spacecraft have been hurtling toward the transition zone. Voyager 1 is closing in.

Much of Voyager 1's long journey has been uneventful. Last year, however, things began to change. In June 2010, Voyager 1 beamed back a startling number: zero. That's the outward velocity of the solar wind where the probe is now.

"This is the first sign that the frontier is upon us," says Krimigis.

Previously, researchers thought the crossing was still years and billions of kilometres away, but a new analysis gave them second thoughts. Krimigis and colleagues combined Voyager data with previously unpublished measurements from the Cassini spacecraft. Cassini, on a mission to study Saturn, is nowhere near the edge of the solar system, but one of its instruments can detect atoms streaming into our solar system from the outside. Comparing data from the two locations, the team concluded that the edge of the heliosphere lies somewhere between 16 to 23 billion kilometres from the sun, with a best estimate of approximately 18 billion kilometres.

Because Voyager 1 is already nearly 18 billion kilometres out, it could cross into interstellar space at any time—maybe even as you are reading this article.

"How close are we?" wonders Ed Stone, Caltech professor and principal investigator of the Voyager project since the beginning. "We don't know, but Voyager 1 speeds outward a billion miles every three years, so we may not have long to wait."

Stay tuned for the crossing.

For more about the missions of Voyager 1 and 2, see http://voyager.jpl.nasa.gov/. Another Voyager project scientist, Merav Opher, is the guest on the newest Space Place Live cartoon interview show for kids at http://spaceplace.nasa.gov/space-place-live.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

FURTHER DISCUSSION

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.yahoogroups.com . You can also unsubscribe from the list here.

To post messages to the list, please send them to abingdonas@yahoogroups.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/ .
Further discussion on astronomy and many other topics takes place at the Spread Eagle pub in Northcourt Road after the main meetings. You are most welcome to join us.

DATES FOR YOUR DIARY

19th Sept. 8pm Beginners' Meeting in the Perry Room.

26th Sept. – 28th Sept. (FCN) 8pm Observing Evening at Bury Down. Ring Ian on the night to confirm on 07557 373401. *[FCN=first clear night]*

10th Oct. 8pm Dr Peter Wheatley, (Univ. Warwick) 'WASP (Wide Angle Search for Planets'.

The editor of "SpaceWatch" is Andrew Ramsey, who would very much appreciate your stories & contributions. Please send any news, observations, photos, etc. to:

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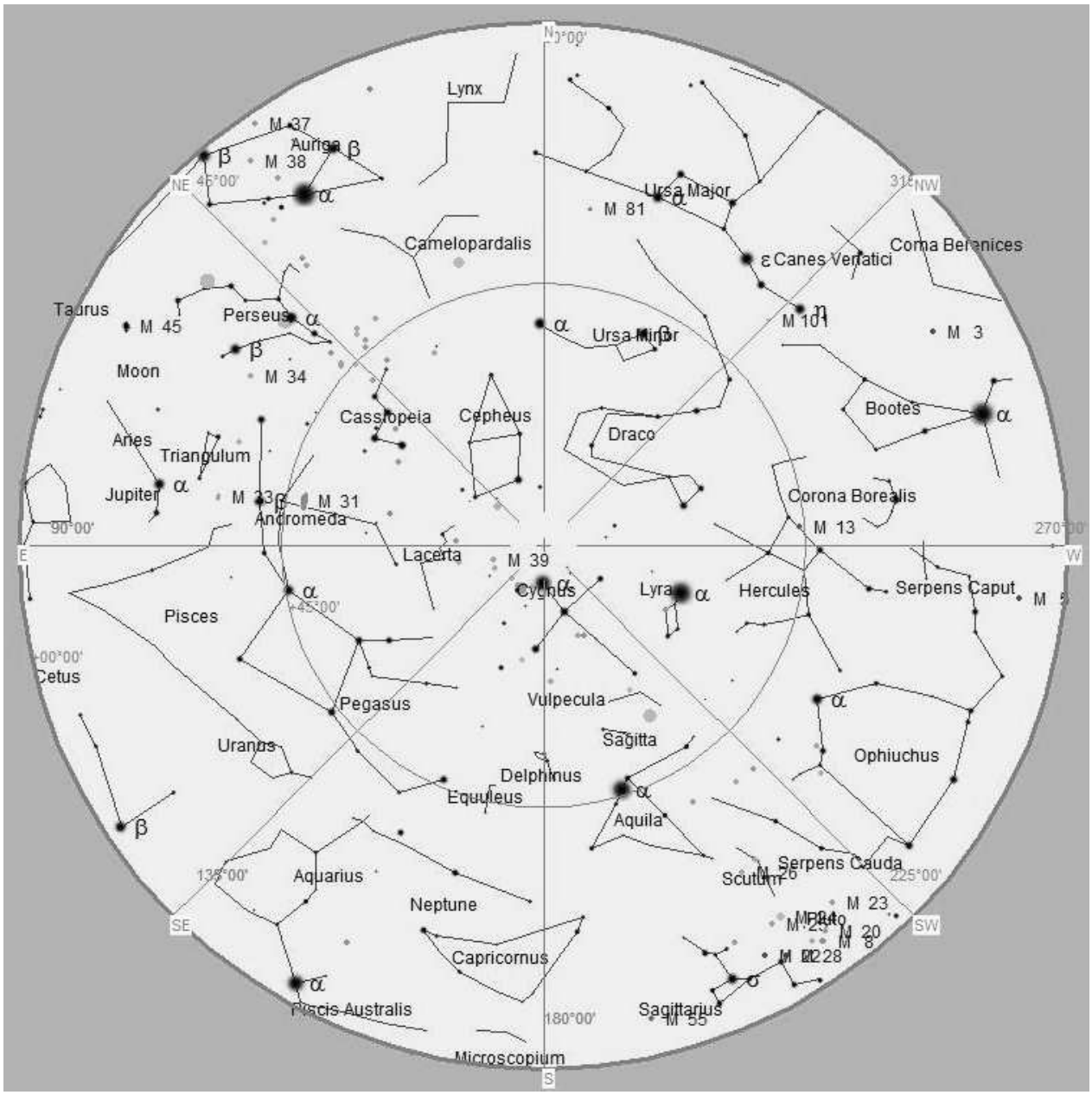
STAR CHART



The Night Sky at 10pm (BST) next Saturday (17th Sept.)