

SPACEWATCH

the newsletter of the Abingdon Astronomical Society

13th June 2011

Dr Stephen Johnston
(Museum of the History of Science, Oxford)
'Astrolabes'

Tonight's talk describes the astronomical instruments made for more than two thousand years now to show the changing positions of the Sun and stars in the sky over the year. They were used to find the time of day, as well as being used as astronomical educational devices.

One such astrolabe may have been used to predict that on Wednesday evening the Sun will set and the Moon will rise at the same time. That's because at the moment of rising the Moon will be totally eclipsed. Sunrise is predicted for 9.15pm BST. Totality finishes at 10.02pm BST, and the Moon will grow slowly back to full Moon, finishing by 11.02pm BST.

THE NIGHT SKY THIS MONTH

by Bob Dryden

Sun & Earth: At 17.16 UT on 21st June the Sun reaches its highest point on the ecliptic, otherwise known as the summer solstice. Two weeks later, on 4th July to be precise, at 14.54 UT the Earth is as far from the Sun as it gets in its yearly orbit. This point is known as aphelion, and Earth is 152,102,197 km away from the Sun (as opposed to about 147 million km when closest).

Mercury: Now just starting a rather poor evening apparition, Mercury reaches greatest eastern elongation of 27° on 20th July. However, the planet is never more than 10° above the horizon at any time. The best time to look will be in the first two weeks of July, at which time Mercury will not only be at its highest, but also its brightest. Look directly west as soon after sunset as you can. Use binoculars to scan low down until you find a lone 'star', and this will be Mercury. Later in July Mercury will become increasingly difficult to see. Inferior conjunction with the Sun is on 17th August, after which Mercury quite rapidly reappears in the morning sky. This is a good apparition and the winged planet should be an easy visual target by late August. Look east, and Mercury will already be 10° high at sunrise by 26th August. By 3rd September the height will have increased to 15° and its brightest will be about magnitude 0 so it should be an easy naked eye target. Greatest western elongation occurs on 3rd September at 18°, after which Mercury starts to move back towards the Sun.

Venus: With superior conjunction happening on 16th August, Venus is always going to be a difficult object to see this session despite its very bright magnitude -3.8. However, if you like a challenge, and have a clear eastern horizon, then you could well succeed in finding the planet. In mid June,

Venus is about 8° high at sunrise, which decreases to about 6° by the end of the month. If you look on the morning of 30th June, there will be a very thin crescent Moon very close to Venus (the Moon will be just to the right of Venus) but it will be a difficult observation to make. Venus will be out of sight for the rest of this session.

Mars: Mars remains a difficult object to see throughout June as it is quite faint at magnitude +1.4 and rises barely an hour before the Sun. By mid July however, this time has increased to 2 hours and the planet is around 25° high at sunrise. So, even though Mars will be low, there is a short opportunity to have a look at it before daylight arrives. Throughout June and July Mars crosses Taurus, before entering Gemini in early August. By August you will have plenty of time to turn your telescope on the red planet as it rises a good 3 hours before the Sun. Do not expect to see much detail on the disc though as the planet's diameter is just 4.8 arc seconds, which is usually too small to see a great deal of surface markings. On the morning of 25th August a waning Moon is just to the right of Mars.

Jupiter: Hanging about the Pisces/Aries border in June, Jupiter crosses into Aries properly by July. Jupiter is moving away from the Sun in the morning sky and increasing in brightness by half a magnitude over the summer (reaching magnitude -2.7 by September). It is an easy object to find because of its bright nature, but you will have to be up early in June to catch it low in the east as it rises about 02.00UT, which isn't long before the Sun. By mid July however, Jupiter is up by about midnight, which gives you plenty of dark sky time to make observations.

Saturn: This is still the only bright planet on view in the evening sky, although you only have the next month or so to get good clear telescopic view as the planet will be heading into the horizon murk by late July. By the end of August it will be about 10° high at sunset and will be an increasingly difficult object to see. Still in Virgo, Saturn shines at about magnitude +0.8 so it is an easy naked eye object at the moment. If you have a look through a telescope, then the rings will be immediately obvious. Currently at an angle of 7.4°, they are now opening out again and by September the angle will have reached 10°.

Uranus: Currently a morning object in Pisces, Uranus is visible in binoculars at magnitude +5.7. It will slowly move into the evening sky, rising around 21.00UT by mid August.

Neptune: Slightly harder to see than Uranus due to its fainter magnitude +7.8, Neptune is still quite easily visible in binoculars if you have a good finder chart. Shining

from within Aquarius, Neptune reaches opposition on 22nd August, after which it is above the horizon all night.

Eclipses: While we do have a total lunar eclipse on 15th June, do not get too excited as conditions are far from favourable. The main part of the eclipse, the umbral phase, starts at 18.22 UT. However, the Moon does not rise until 20.15 UT, so, obviously, we are going to miss the first half of the eclipse. Totality also begins while the Moon is below the horizon, at 19.22 UT. So the rising Moon will already be totally eclipsed, on the horizon, and the sky will still be very light as the Sun has only just set. So seeing the eclipse at this point in time will certainly be difficult, made even more so if the eclipse turns out to be a dark one. During a total lunar eclipse, the Moon loses its light from the Sun and so becomes darker. We never know just how dark the lunar disc will become. Often it turns a coppery colour and remains easily visible, but at other times it can become so dark as to be invisible.

Totality ends at 21.02 UT when the Moon will be just 9° above the horizon. This means you will need a good clear south eastern horizon to see anything of totality. The Moon finally leaves the umbral shadow at 22.02 UT when it will be about 13° high. The eclipse finally ends when the Moon leaves the penumbral shadow at 23.00 UT but the penumbral phase of any lunar eclipse is hardly noticeable.

So, this eclipse is going to be a difficult one to observe, but its low elevation could possibly give some nice imaging possibilities. An eclipsed Moon with foreground objects is always good.

Meteors: There is just one major meteor shower over the summer and that is the Perseids. Active between 23rd July and 20th August, this is the shower everyone looks forward to. It is reliable, with up to 80 meteors an hour at maximum on the morning of 13th August at 04.00 UT. If clear, the weather is usually warm, which everyone likes. Unfortunately, this year there is one major fly in the ointment in the shape of the Full Moon. The Moon is 14 days old on the night of the maximum, and is shining very brightly all night long. This means all the fainter meteors will be invisible because of moonlight, and the hourly count will be low indeed. Apart from the Perseids, there are several minor showers active during this period but their hourly rates are very low (usually below 5 an hour). Probably the best in this category are the Capricornids and the Aquarids. Both are more southern showers though and their meteor rates, even at maximum, are in single figures.

Asteroids & Dwarf Planets: This summer gives you the chance to see one of our dwarf planets. 1 Ceres was reclassified from an asteroid to a dwarf planet a few years ago and it brightens nicely this summer. Starting at a faint magnitude +9.1 in June, Ceres reaches its brightest magnitude of +7.6 in mid September. You will need a chart of the Cetus/Aquarius border region and a pair of binoculars if you want to find this dwarf planet.

In Capricornus there is a bright asteroid in the form of 4 Vesta. Another easy binocular target at magnitude +6.7 in June, Vesta brightens to mag. +5.7 by 5th August when it reaches opposition. Mid September sees its brightness dimming slightly to magnitude +6.4.

If you fancy a slightly harder asteroid challenge, then 15 Eunomia is your target as it is quite faint at magnitude +9.9 in June, and only reaches magnitude +9.1 by September. Currently in Aries, Eunomia crosses into Perseus in the second half of August. It will continue to get brighter until the end of November (when it will be mag. +7.9).

Another faint asteroid in June is 192 Nausikaa at magnitude +10.1. Residing in Aquarius, just below the Square of Pegasus, 192 brightens quickly, reaching mag. +8.5. by the end of August, before fading slightly to mag. +8.8 by September.

Comets: There are two comets worth mentioning for this summer.

Comet C/2010 X1 Elenin was discovered last year, but is only now approaching the Sun and the Earth. In mid July Elenin will be quite faint at about magnitude +10.1 in Leo. By the end of July it could be around 9th magnitude, and by mid August be somewhere around 6th or 7th magnitude. While all this sounds great, remember that the comet is getting brighter because it is getting nearer to the Sun – which means it will be entering the evening twilight more and more as the days progress. Hopefully though, the comet will compensate for this by getting brighter and brighter. It is predicted to reach 3rd magnitude by the end of August, although by then the comet will be very deep into bright twilight. You will need to look towards the south west as Elenin will be crossing Virgo by then. How bright comets become is always rather unpredictable business as they often do not perform as expected. While this means they can be fainter than expected, it also means they can be brighter. We do not get many bright comets, and this one promises to be such a thing, so do make the effort to see this one – who knows, it might turn out to be the brightest of the decade. Elenin will probably be at its brightest after it goes around the Sun (comets often are) but by then it will be a morning object, and so beyond all but the keenest of observers.

The other comet on view through the summer is 2009 P1 Garradd. This one starts the session at about magnitude +10.8, crossing Pisces. It slowly brightens to about 9th magnitude through July, moving amongst the stars of Pegasus. Then, crossing Delphinus, Sagitta, and Hercules, Garradd finally reaches 8th magnitude by September. Its brightest period will be at the end of the year when it reaches 7th magnitude.

Noctilucent Cloud: With summer comes noctilucent cloud. Look towards the north after sunset, and any bright white, often spidery looking, cloud is probably noctilucent cloud. This sort of cloud is much higher than normal cloud and so remains in sunlight, hence, it is bright cloud against a darker sky.

Noctilucent cloud is only visible during summer (because the Sun is not too far below the horizon) and can often provide quite spectacular displays. It is usually seen just after sunset and just before sunrise, but big displays can mean it is visible for long periods of the short summer nights.

MOON PHASES:

Full: 15th June; Last Qtr: 23rd June; New: 1st July; First Qtr: 8th July; Full: 15th July; Last Qtr: 23rd July; New: 30th July; First Qtr: 6th Aug.; Full: 13th Aug.; Last Qtr: 21st Aug.; New: 29th Aug.; First Qtr: 4th Sept.



FINDING PLANETS AMONG THE STARS

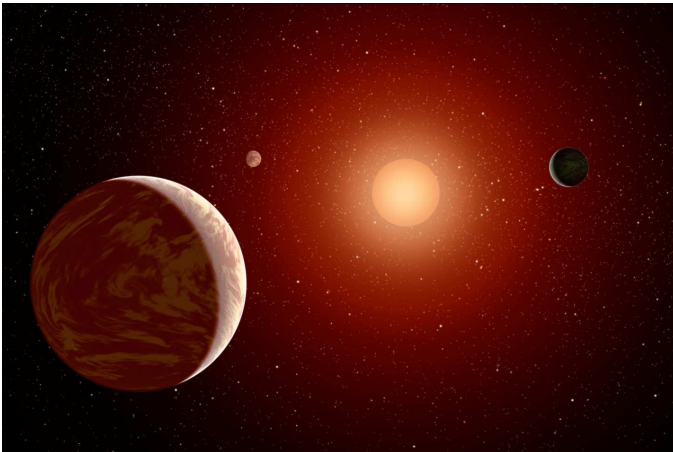
by Dr Tony Phillips

Strange but true: When it comes to finding new extra-solar planets, or exoplanets, stars can be an incredible nuisance.

It's a matter of luminosity. Stars are bright, but their planets are not. Indeed, when an astronomer peers across light years to find a distant Earth-like world, what he often finds instead is an annoying glare. The light of the star itself makes the star's dim planetary system nearly impossible to see.

Talk about frustration! How would *you* like to be an astronomer who's constantly vexed by stars?

Fortunately, there may be a solution. It comes from NASA's Galaxy Evolution Explorer, an ultraviolet space telescope orbiting Earth since 2003. In a new study, researchers say the Galaxy Evolution Explorer is able to pinpoint dim stars that might not badly outshine their own planets.



Exoplanets are easier to see directly when their star is a dim, red dwarf.

"We've discovered a new technique of using ultraviolet light to search for young, low-mass stars near the Earth," said David Rodriguez, a graduate student of astronomy at UCLA, and the study's lead author. "These M-class stars, also known as red dwarfs, make excellent targets for future direct imaging of exoplanets."

Young red dwarfs produce a telltale glow in the ultraviolet part of the electromagnetic spectrum that Galaxy Evolution Explorer can sense. Because dwarf stars are so numerous—as a class, they account for more than two-thirds of the stars in the galaxy—astronomers could reap a rich bounty of targets.

In many ways, these stars represent a best-case scenario for planet hunting. They are close and in clear lines-of-sight, which generally makes viewing easier. Their low mass means they are dimmer than heavier stars, so their light is less likely to mask the feeble light of a planet. And because they are young, their planets are freshly formed, and thus warmer and brighter than older planetary bodies.

Astronomers know of more than five hundred distant planets, but very few have actually been seen. Many exoplanets are detected indirectly by means of their "wobbles"—the gravitational tugs they exert on their central stars. Some are found when they transit the parent star, momentarily dimming the glare, but not dimming it enough to reveal the planet itself.

The new Galaxy Evolution Explorer technique might eventually lead to planets that can be seen directly. That would be good because, as Rodriguez points out, "seeing is believing."

And it just might make astronomers feel a little better about the stars.

The Galaxy Evolution Explorer Web site at <http://www.galex.caltech.edu> describes many of the other discoveries and accomplishments of this mission. And for kids, how do astronomers know how far away a star or galaxy is? Play "How Old do I Look" on The Space Place at <http://spaceplace.nasa.gov/whats-older> and find out!

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.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/> .

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

20th June 8pm Beginners' Meeting in the Perry Room.

12th Sept 8pm First speaker meeting of the new season. Watch the website for details.

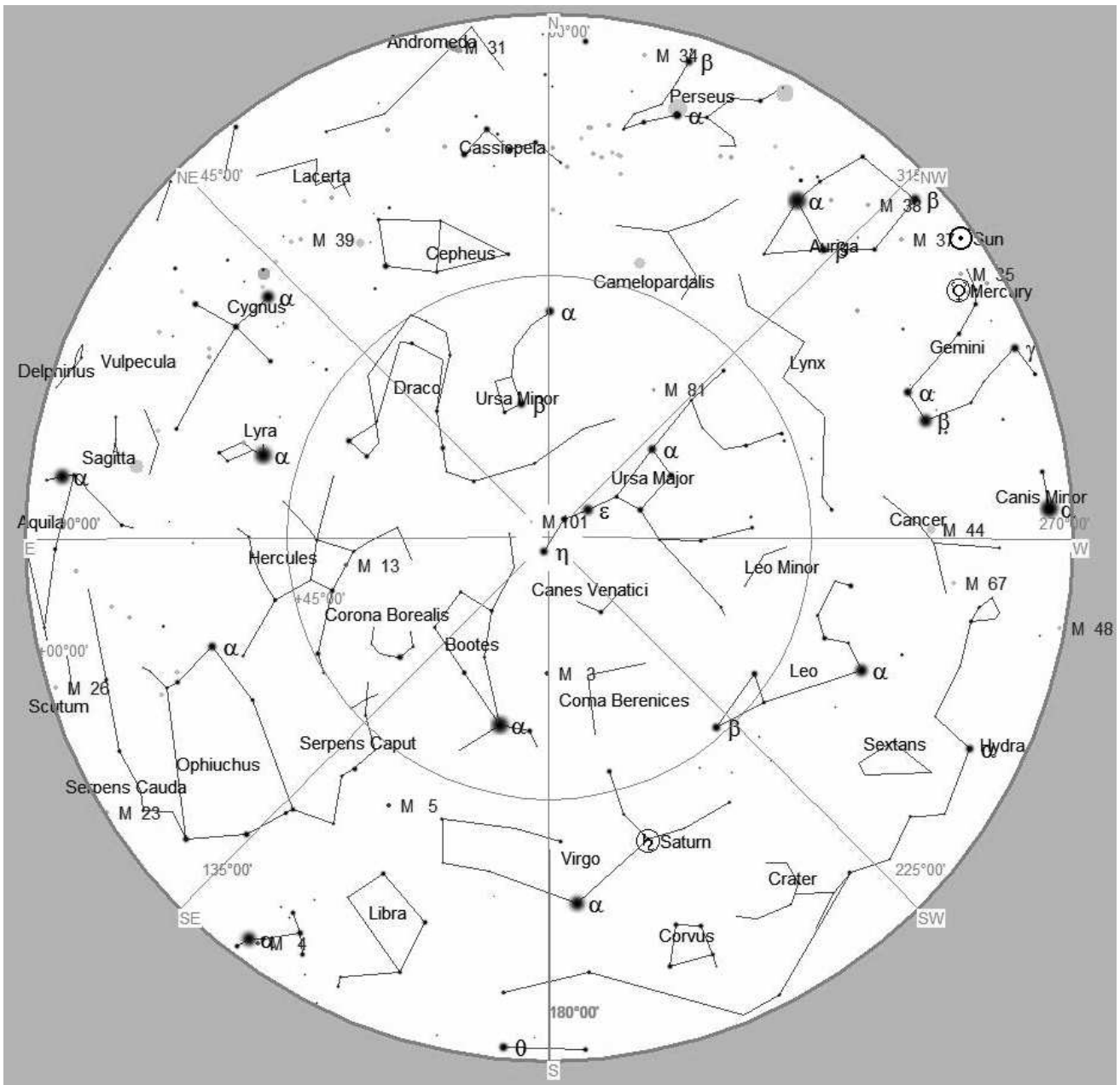
The editor of "SpaceWatch" is Andrew Ramsey, who would very much appreciate your stories & contributions. Please send any news, observations, photos, etc. to:

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STAR CHART



The Night Sky at 10pm (BST) next Saturday (18th June)

Look due south tonight and you will see two bright stars – stellar neighbour Arcturus in Böotes (36 light-years away), and blue giant Spica in Virgo (260 light-years away). Also in Virgo is Saturn whose rings are starting to open out again.

M13 in Hercules is over in the east. This globular cluster is well worth a look in a small telescope.

Cassiopeia and Perseus are low in the north.