SPACEWATCH

the newsletter of the Abingdon Astronomical Society

8th June 2009

Chris Lintott (University of Oxford & BBC) '25,000 Eyes: The Latest from Galaxy Zoo'

This month we welcome Chris Lintott, not only from the University of Oxford, but also co-presenter of the longest running television programme in the world – the BBC's "The Sky at Night".

Chris is going to talk to us about an ambitious project to classify a million galaxies from their photographs, enlisting the help of tens of thousands of volunteers.

THE NIGHT SKY THIS MONTH

by Bob Dryden

Sun: The summer solstice occurs on 21st June at 05.45 UT after which the nights start drawing in again (soon be Christmas). Remember to stop and take a moment to contemplate the fact that the Earth is at its furthest from the Sun on 4th July. The Earth's orbit is slightly elliptical so we are just 147 million kilometres from the Sun in January (our nearest) while in July we are 152 million kilometres away.

Mercury: At the moment Mercury is in the morning sky, reaching its greatest elongation from the Sun on 13th June at 24°. Unfortunately this is a very poor apparition and it is difficult to see the planet at all. Mercury passes behind the Sun on July 14th, reappearing in the evening sky after that. However, this evening apparition is also very poor and you will be very hard pushed to see Mercury at all. Greatest elongation is 27° on 24th August but Mercury is never more than 8° above the horizon at sunset. By the time the sky has gone dark enough to see Mercury the planet will be virtually on the horizon. The good news is that after two poor apparitions, the next one will be the best morning apparition of the year.

Venus: Now just passed it greatest elongation (6th June), Venus starts to move back towards the Sun. The angle between Venus and the Sun decreases from 46° on 8th June to just 29° by 14th September. The phase increases during this time from 0.5% to 0.8% which means it goes from half phase, to a fat gibbous shape by September.As the planet is physically moving away from Earth through summer, its apparent size decreases from 23 arc seconds to 12 arc seconds. However, it is still very bright and easy to see once it is above the horizon as it is still -3.8 magnitude, even by September. It rises about 2.5 hours before the Sun in July, and about 3 hours before the Sun by August, as it crosses from Taurus into Gemini. By the middle of August, Venus will be 21° above the horizon at sunrise (the best it is going to get this time). During June, Venus is fairly close to Mars. In fact, on 21st June they are just 2° apart.

Mars: We have hardly seen Mars for some months now as it has been hugging the morning horizon, and remaining relatively faint. However, the planet is now slowly coming into view. It is still rather small in the eyepiece though, growing from a paltry 5 arc seconds to just 6 arc seconds by September. It is difficult to see any detail visually on the disc until it is about 10 arc seconds across. It does brighten a bit through the summer, going from +1.2 to +0.9 mag. What makes it easier to find is that it moves into Taurus in July, and Gemini by the end of August which means by the time the Sun rises, Mars is high in the south east. It actually appears above the horizon in September by midnight BST so it can be seen against a dark sky at last.

Jupiter: This planet is presently easily visible in the south east before dawn. It is shining at -2.5 mag at the moment, and it gets brighter by September, reaching -2.8 mag. Jupiter reaches opposition on 14th August by which time it will be rising at about 21.00 BST making it easier to see for those who like their bed early. On 9th July Jupiter is just half a degree south of Neptune. While Jupiter will be an easy naked eye object, you will need binoculars of course to see Neptune. Jupiter, Neptune, and the Moon will form an equilateral triangle on 2nd September but I suspect Neptune will be hard to see because of the brightness of the Moon. Might be worth a look though, just the same. Watch out for the mutual events throughout the summer involving Jupiter's satellites. They will occult one another, and pass through each others shadows at various times as the Earth is in the same plane as the Jovian satellites for the time being.

Saturn: This is the only planet on view in the evening sky at the moment but you had better make the most of it now as it will not be long before Saturn is lost to the solar glare. Conjunction with the Sun occurs on 17th September, but you will probably loose sight of Saturn by the beginning of August. It is still in southern Leo, shining at +1.0 mag so it is not hard to find. The rings are at an angle of 3.8°, but they are gradually closing until the Earth crosses the ring plane in September when their angle will be zero as we would be looking at them edge on. I say 'would be' because we will not actually be able to see the moment of ring crossing because Saturn will be behind the Sun at the time.

Uranus + Neptune: Uranus is in Pisces, just below the Square of Pegasus which means it is only visible in the morning sky at the moment. It reaches opposition on 17th September. Neptune is still in Capricornus and reaches opposition a bit earlier, on 18th August. Neptune appears quite close to Jupiter all summer, reaching opposition only 4 days later. Binoculars and a good finder chart will enable you to see both these planets.

Eclipses: While there are two eclipses over the summer, neither will be spectacular from the UK.

The first is a total solar eclipse that begins at 00.51UT. As that is just after midnight in the UK, obviously it will be dark and the Sun is below the horizon. You will have to travel to the other side of the world to see this one. [Ed. China is good.]

The second eclipse is visible from here, but it such a poor one I doubt you will notice a thing. It is a partial penumbral eclipse of the Moon. This involves less than half the Moon's disc passing through the outer regions of the Earth's shadow, known as the penumbra. The penumbra is so feeble, that it is very hard to see against the bright lunar disc at the best of times. As only a fraction of the lunar disc is entering the penumbra this time, it will be extremely difficult to notice any change on the disc at all. However, if you want to have a try, the eclipse starts at 23.01 UT and ends at 02.17 UT. The Moon will be 15° high in the south east, in Capricornus, at the beginning of the eclipse. To add a little bit of interest to the view, Jupiter will just below the Moon.

Occultations: 30th June sees the +4.9 mag star, 69 Virgo, occulted by the Moon at 20.56UT. The Moon will be at first quarter, about 20° high in the south. On July 3rd the 3.0 mag star, Pi Pisces, is occulted at 19.17 UT, and reappears at 19.39 UT. Unfortunately the Moon will be very low in the south east at the time but if you have a clear horizon in that direction then this event will be visible in any small telescope.

July 18th sees the open cluster, the Pleiades, occulted. This is at a somewhat unsociable hour of 02.00 UT so you will have to make a special effort to see this one. Several occultations occur over the next hour or so as a gibbous Moon crosses the cluster.

Meteors: There is only one major shower over the summer, the Perseids. With an hourly rate of around 80 meteors an hour, this is a very popular shower as if it is clear, it is usually fairly mild as well. The bad news is that this year the Moon spoils the party. A last quarter Moon rises around 22.00 UT on the night of maximum, 12th August, and will drown out most of the fainter meteors. You will still see the brighter ones however, but you will not see 80 meteors an hour this year.

There are several minor meteor showers active throughout summer if you are keen to see some meteors. These include the Alpha Cygnids, the Capricornids, and the Iota Aquarids. Their hourly rates are very low though at around 5 meteors an hour. The best of the minor showers is probably the Delta Aquarids, but the hourly rate is only 20 at best and as this shower is quite far south, from the UK the hourly rate is probably nearer 8 or 10 at best.

Comets: There are two periodic comets that are returning during the summer but neither will get very bright. Comet 22 P/Kopff is crossing Aquarius so it is a morning object. Presently around 9th magnitude, it reaches a maximum of about 8.5 mag through July before rapidly fading to near 10th magnitude by September. The second comet is 88P/Howell which will be visible in Virgo so, an evening object. Right now it is a lowly 12th magnitude, but it will brighten to around magnitude 10 by early August, and reach 9th magnitude by September.

Asteroids: If you have a small telescope, or good binoculars, then there are 4 asteroids that you can hunt down this summer. 1 Ceres is still around, crossing from Leo into Virgo. It fades from +8.5 mag to +8.8 mag by the end of July when it will be getting too close to the Sun to see anymore. 3 Juno is in Pisces, shining at a relatively faint +9.7 mag at the start of July before it brightens to +8 mag by September. 7 Iris is presently +9.5 mag in Sagittarius. It reaches a maximum of +8.8 in early July before fading to 10th magnitude into September. The final asteroid is 18 Melpomene. It inhabits the Pisces/Cetus border region as it increases in brightness from +9.4 mag at the beginning of August to +8.4 mag in September. It continues to get brighter until October when it will be magnitude +8.

Clouds: [Ed. Yes, clouds…] Finally, do not forget to keep a watchful eye on the northern horizon after the Sun has set. Summer is the season for Noctilucent Cloud. This is cloud that is so high up, that the Sun continues to illuminate it long after the sky has gone dark. While, as astronomers, we are not usually pleased to see cloud, this is one form of cloud we actually hope to see.

MOON PHASES:

Full: 7th June; Last Qtr: 15th June; New: 22nd June; First Qtr: 29th June; Full: 7th July; Last Qtr: 15th July; New: 22nd July; First Qtr: 28th July; Full: 6th Aug.; Last Qtr: 13th Aug; New: 20th Aug.; First Qtr: 27th Aug.; Full: 4th Sept.; Last Qtr: 12th Sept.

LAST MONTH'S TALK

by Gwyneth Hueter

After sprinting through the AGM (still not a club record, apparently), we were treated to an account of Bob Dryden's holiday in New Zealand in January of 2009.

Although the North Island, where he stayed, boasts only about 3 million people, Bob still managed to dig out quite a few astronomical societies. They tend to revolve around observing rather than speaker sessions because traveling is quite a problem and the populations are so sparse. It seems every society has an observatory and because NZ is so generous with its public grants, they're usually very good.

Bob amused us with his account of one rather elderly group who moved their weekly meeting date to accommodate a new younger member, and another group in a larger town (a little bigger than Wallingford, perhaps!) who have a public observatory with its own car park (NZ grants again). The car park has a street light (aagh!), but the society has access to the key to switch it off when observing. This was at Whakatane ('wh' is pronounced 'f') on the Eastern Cape. Bob visited on a public observing night, which turned out to be a very busy one (it was when comet Lulin was around), so much so that he ended up helping and got his photo and a writeup in the local paper as a result!

Bob's trip ended near Whangarei, not far from where ex-AAS member Deborah Hambly (who is now a Mum) lives. She's started up an observing group, and yes, it has

its own observatory and 15" reflector. If you want to stay in a great place for observing, get the details from Bob, as he was at an excellent dark site near the sea and he had the use of a pair of 25x100 binoculars on a tripod. He got a view of Mercury, and his first ever view of the zodiacal light.

SCORING MORE ENERGY FROM LESS SUNLIGHT

For spacecraft, power is everything. Without electrical power, satellites and robotic probes might as well be chunks of cold rock tumbling through space. Hundreds to millions of miles from the nearest power outlet, these spacecraft must somehow eke enough power from ambient sunlight to stay alive.

That's no problem for large satellites that can carry immense solar panels and heavy batteries. But in recent years, NASA has been developing technologies for much smaller microsatellites, which are lighter and far less expensive to launch. Often less than 10 feet across, these small spacecraft have little room to spare for solar panels or batteries, yet must still somehow power their onboard computers, scientific instruments, and navigation and communication systems.

Space Technology 5 was a mission that proved, among other technologies, new concepts of power generation and storage for spacecraft.

"We tested high efficiency solar cells on ST-5 that produce almost 60 percent more power than typical solar cells. We also tested batteries that hold three times the energy of standard spacecraft batteries of the same size," says Christopher Stevens, manager of NASA's New Millennium Program. This program flight tests cutting-edge spacecraft technologies so that they can be used safely on mission-critical satellites and probes.

"This more efficient power supply allows you to build a science-grade spacecraft on a miniature scale," Stevens says.

Solar cells typically used on satellites can convert only about 18 percent of the available energy in sunlight into electrical current. ST-5 tested experimental cells that capture up to 29 percent of this solar energy. These new solar cells, developed in collaboration with the Air Force Research Laboratory in Ohio, performed flawlessly on ST-5, and they've already been swooped up and used on NASA's svelte MESSENGER probe, which will make a flyby of Mercury later this year.

Like modern laptop batteries, the high-capacity batteries on ST-5 use lithium-ion technology. As a string of exploding laptop batteries in recent years shows, fire safety can be an issue with this battery type.

"The challenge was to take these batteries and put in a power management circuit that protects against internal overcharge," Stevens explains. So NASA contracted with ABSL Power Solutions to develop spacecraft batteries with design control circuits to prevent power spikes that can lead to fires. "It worked like a charm."

Helen Johnson, a spacecraft technician at NASA's Goddard Space Flight Center, works on one of the three tiny Space Technology 5 spacecraft in preparation for its technology validation mission.

Now that ST-5 has demonstrated the safety of this battery design, it is flying on NASA's THEMIS mission (for Time History of Events and Macroscale Interactions during Substorms) and is slated to fly aboard the Lunar Reconnaissance Orbiter and the Solar Dynamics Observatory, both of which are scheduled to launch later this year.

Thanks to ST-5, a little sunlight can go a really long way.

Find out about other advanced technologies validated in space and now being used on new missions of exploration at nmp.nasa.gov/TECHNOLOGY/scorecard. Kids can calculate out how old they would be before having to replace lithium-ion batteries in a handheld game at spaceplace.nasa.gov/en/kids/st5_bats.shtml.

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 abastro 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 meeting. You are most welcome to join us.

DATES FOR YOUR DIARY

15th June. 8pm. Beginners' Meeting in the Perry Room.

14th September. 8pm. The first meeting of the new season – Speaker meeting in the main hall.

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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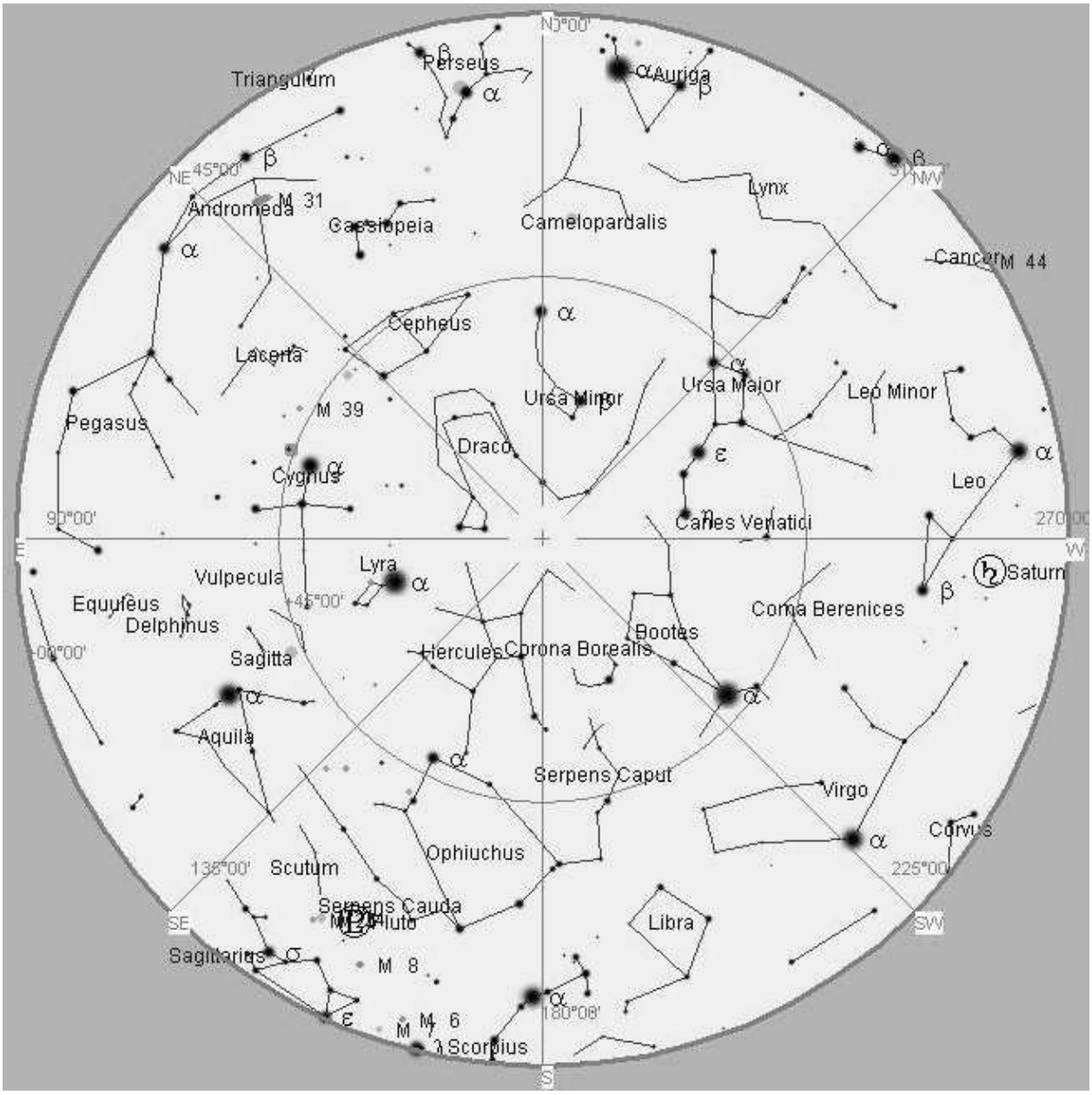
STAR CHART



The Night Sky at 23:59pm (BST) next Saturday (13th June)

You have to stay up late at this time of the year to see it get properly dark. If you do, you'll see the summer triangle of Vega (in Lyra), Altair (in Aquila) and Deneb (in Cygnus) starting to dominate the night sky, as they continue to do throughout the summer. Ursa Major is very high at this time of the year too. Arcturus, the brightest star in the northern hemisphere, in Boötes, the Herdsman dominates the south-west, with red Spica below it near the horizon.

Saturn, in the far south-west, has almost set by this time. There are no other planets on view. Look out for the globular cluster M13 in Hercules. It's about one third of the way from Vega to Arcturus.

The centre of our galaxy is in the direction of Sagittarius and Scorpius. Sadly, from our northerly latitude they never rise that high, but if you are going southwards on holiday this summer, look out for the lovely star clouds in that direction.