SPACEWATCH
the newsletter of the Abingdon Astronomical Society

13th December 2010

Stan Cocking Memorial Lecture:
Dr Arfon Smith
(University of Oxford),
'Galaxy Zoo'

Stan Cocking was one of the founder members of Abingdon Astronomical Society. This lecture is dedicated to him. He would have enjoyed it.

There are one hundred thousand million stars in our Galaxy, the Milky Way (give or take a few million), and there are approximately a hundred thousand million galaxies in the observable universe. That's a lot, and classifying all of them will take a long time. Fortunately, you can help here, and Dr Arfon Smith is here tonight to talk about a project in which you can help classify galaxies from their photographs. Well it's something to do on those cloudy winter nights, isn't it?

THE NIGHT SKY THIS MONTH

by Bob Dryden

Earth & Sun: It is that time of the year again when, believe it or not, we are the closest we are going to get to the Sun. The magic date is 3rd January, and Earth will be 147 million kilometres from our star (as opposed to 152 million kms at our furthest in July), so have a think about that as you shiver in the cold. On 21st December at 23hr 38 min. UT the Sun reaches the most southerly point in its orbit, in the constellation of Sagittarius. Otherwise known as the winter solstice, from this time onward the days become longer as we head towards spring.

Mercury: Presently out of view, Mercury reaches inferior conjunction with the Sun on 20th December, after which it rapidly reappears in the morning sky. Greatest western elongation occurs on 9th January when the planet will be 23° from the Sun. By 10th January, Mercury will be about 10° high in the south east at sunrise. Shining at magnitude -0.2, you should be able to find it in binoculars fairly easily.

Venus: This planet reaches greatest western elongation on 8th January when it will be a whopping 47° from the Sun, shining at a dazzling magnitude -4.4 in the south east. Venus rises about 04.00 UT in December, which is nearly 4 hours before the Sun. By sunrise Venus is 25° high, in Libra, which is about the best it is going to get this apparition. The phase is increasing until it is 50% (or half, if you prefer) by the time of elongation. An observational challenges for you is to judge on what date Venus actually attains half phase – it is not usually the same date as elongation. On the morning of 31st December there will be a nice crescent Moon just a few degrees below Venus, while off to the east you will see Mercury shining through the twilight. You do not even have to get up very early to see this as it will all be on view round about 07.15 am.

Mars: Mars is too close to the Sun now to be seen at the moment.

Jupiter: Approximately due south at about sunset this session, Jupiter is easy to find shining at a bright magnitude -2.3 in Pisces. Any small telescope will show you the four satellites moving around the planet. Look out for the development of the returning South Equatorial Belt which disappeared earlier this year.

Saturn: This planet rises about 02.00 UT in mid December, but by midnight once we get into January. Being in Virgo, it will not reach great heights above the horizon, but the rings are slowly opening out nicely now, reaching about 10° this session.

Uranus & Neptune: Uranus and Jupiter are once again approaching each other, making it very easy for you to actually find Uranus. In December Uranus is to the left of Jupiter, but by the time we reach mid January, Uranus is immediately above Jupiter. Shining at magnitude +5.7, Uranus is easy to see in binoculars. Neptune is fainter (mag. +7.8) and closer to the evening twilight as it presently resides close to the Aquarius/Capricornus border. By mid January it is only 20° high at sunset which will make it a challenge to find. Again, binoculars would be enough to see it, although you will need a good finder chart.

Eclipses: It has been quite some time since we had either a solar or lunar eclipse, and like buses, we now have not one, but two this session. Unfortunately, neither can be seen at their best.

For the first time in nearly 3 years, we have a total lunar eclipse visible from the UK. Unfortunately we will not be able to see the whole eclipse as the Moons sets before it is over. The relevant morning (sorry, but you are going to have to get up early to see this) is on 21st December. The whole event is going to occur in the west, and very low down at that, so make sure you are in such a position as to see as low as possible. The Moon starts to enter the Earth's penumbral shadow at 05.29 UT (when the Moon will be about 20° high). This part of the eclipse is usually very hard to detect as the penumbral shadow is faint.
The umbral shadow is reached at 06.32 UT (with the Moon 13° high). You should be able to notice this quite easily. Totality begins at 07.40 UT with the Moon just 3° high (which is very low indeed). In any normal lunar total eclipse, the Moon goes dark at best, and can even disappear altogether – we never know in advance just how dark the eclipse will be. In this particular event, it is a very good bet that the Moon will disappear completely

because it is so low, so binoculars or a telescope will probably be needed to see it by the time totality starts. The Moons sets at about 08.00 UT, but totality does not end until 08.53 UT, so you can only see the very beginning of the full eclipse from here.

The second eclipse occurs on the morning of 4th January, when we have a partial solar eclipse. The eclipse actually starts at 06.40 UT but the Sun does not rise here in the UK until about 08.15 UT. So the Sun will rise already partially eclipsed, but remember that it will still be too bright and dangerous to view without a solar filter of some sort. At maximum, 85% of the solar disc will be hidden, but unless you have totally clear horizon, that point will probably have passed by the time you can see anything. The eclipse is due to end at 11.00 UT.

Meteors: There are two of the major meteor showers active this session.

The first is the Geminids which can be seen between 7th and 16th December. The maximum occurs at 06.00 UT on the morning of the 14th when, all things being perfect, you may see up to 100 meteors an hour. The First Quarter Moon sets at about midnight, giving you a nice dark sky until dawn. Geminid meteors are often bright and slow, making them spectacular to watch.

The second shower is the Quadrantids. This one is active from 1st to 6th January, with the maximum occurring at about midnight on the night of 3rd/4th. This is equally active, with rates of around 80 meteors an hour at maximum. However, Quadrantid meteors are usually fairly faint and swift. As the New Moon falls on the 4th January, the whole night is dark, but the best time to see Quadrantid meteors is after midnight, with rates usually rising as dawn approaches. Of course, if it is clear in January, it is usually cold, so wrap up well if you are going to have a go at this shower.

Asteroids: There is only one brightish asteroid this session and that is 7 Iris. Currently to be seen in Cancer, Iris brightens from mag.+8.6 in mid December to mag. +8.1 by mid January (it reaches +7.9 later in the month). So a pair of binoculars and a finder chart are all you need to see this object. During the 2nd/3rd week of December, Iris is just above the 7th magnitude open cluster, M67.

MOON PHASES:

First Qtr: 13th Dec.; Full: 21st Dec.; Last Qtr: 28th Dec.; New: 4th Jan.; First Qtr: 12th Jan.

LAST MONTH'S (SURPRISE) TALKS

by Gwyneth Hueter

Our expected speaker had some problem with a date mix-up so we were treated to a two-parter from members.

Graham Pinson has found a fascinating skeleton in his cupboard, namely his grandfather, Mr William Porthouse (1874-1964). A bright lad who had to work from an early age, he became very active in astronomy at the turn of the last century and was one of the stalwarts of Manchester Astronomical Society from 1905 until 1956. He was President from 1927-1956 (phew!). He was a keen lunar observer and contributed much to the BAA Lunar Section reports. Graham found evidence that he edited the Manchester AS journals up to the 1920s and he described a trip up Mount Helvellyn shortly after the Tunguska meteorite crash (1908) and saw the sky all lit up.

Our second surprise package was one-time Manchester AS member (as I was once!) Bob Dryden, who gave us a 'Tourist's Guide to Greenwich Observatory'. He recommends that you go, especially now that it has a new planetarium with proper shows that are meant to educate, not like the bits of technicolour fluff you got at Madame Tussaud's. You can also play with hands-on science stuff at the Astronomy Centre. Go to the Pavilion Tea Room for a drink, rather than trying to get anything on site. You'll see the first ever public clock at the observatory and a large piece of Herschel's 40 foot telescope tube. And you can fight with all the Japanese tourists in order to stand on the Greenwich Meridian line (East meets West). Flamsteed House Octagon Room gives you great balcony views. Try to get there early as the place is soon heaving. Not surprising as it's free, apart from the planetarium shows (£6.50 when he went).

Thanks to Graham and Bob for stepping into the breach.

NASA Space Place

CLOSE ENCOUNTERS WITH JUPITER

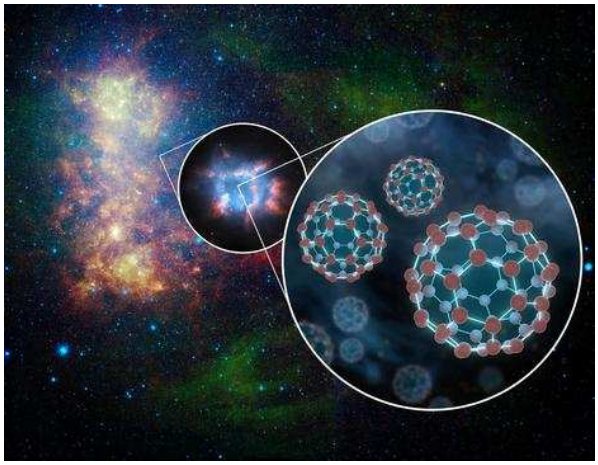
by Dr Tony Philips

Deep in interstellar space, in a the swirling gaseous envelope of a planetary nebula, hosts of carbon atoms have joined together to form large three-dimensional molecules of a special type previously seen only on Earth. Astronomers discovered them almost accidentally using NASA's Spitzer Space Telescope.
"They are the largest molecules known in space," declared Jan Cami of the University of Western Ontario, lead author of a paper with three colleagues published in Science online on July 22, 2010, and in print on September 3.

Not only are the molecules big: they are of a special class of carbon molecules known as "fullerenes" because their structure resembles the geodesic domes popularized by architect Buckminster Fuller. Spitzer found evidence of two types of fullerenes. The smaller type, nicknamed the "buckyball," is chemical formula C60, made of 60 carbon atoms joined in a series of hexagons and pentagons to form a spherical closed cage exactly like a black-and-white soccer ball. Spitzer also found a larger fullerene, chemical formula C70, consisting of 70 carbon atoms in

an elongated closed cage more resembling an oval rugby ball.

Neither type of fullerene is rigid; instead, their carbon atoms vibrate in and out, rather like the surface of a large soap bubble changes shape as it floats through the air. “Those vibrations correspond to wavelengths of infrared light emitted or absorbed—and that infrared emission is what Spitzer recorded,” Cami explained.



Superimposed on a Spitzer infra-red photo of the Small Magellenic Cloud is an artist’s illustration depicting a magnified view of a planetary nebula and an even further magnified view of buckyballs, which consist of 60 carbon atoms arranged like soccer balls.

Although fullerenes have been sought in space for the last 25 years, ever since they were first identified in the laboratory, the astronomers practically stumbled into the discovery. Co-author Jeronimo Bernard-Salas of Cornell University, an expert in gas and dust in planetary nebulae, was doing routine research with Spitzer's infrared observations of planetary nebulae with its spectroscopy instrument. When he studied the spectrum (infrared signature) of a dim planetary nebula called Tc 1 in the southern-hemisphere constellation of Ara, he noticed several clear peaks he had not seen before in the spectra of other planetary nebulae.

“When he came to me,” recounted Cami, an astrophysicist who specializes in molecular chemistry, “I immediately and intuitively knew it I was looking at buckyballs in space. I've never been that excited!” The authors confirmed his hunch by carefully comparing the Tc 1 spectrum to laboratory experiments described in the literature.

“This discovery shows that it is possible—even easy—for complex carbonaceous molecules to form spontaneously in space,” Cami said. “Now that we know fullerenes are out there, we can figure out their roles in the physics and chemistry of deep space. Who knows what other complex chemical compounds exist—maybe even some relevant to the formation of life in the universe!”

Stay tuned!

Learn more about this discovery at http://www.spitzer.caltech.edu . For kids, there are lots of beautiful Spitzer images to match up in the Spitzer Concentration game at:
http://spaceplace.nasa.gov/en/kids/spitzer/concentration

This article was provided courtesy of 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

10th Jan. 8pm Talk by Ian King of Ian King Imaging, entitled ‘Imaging’!

17th Jan. 8pm Beginners’ Meeting in the Perry Room.

31st Jan. – 2nd Feb. (FCN) 8pm Observing Evening at Britwell Salome. Ring Ian on the night to confirm on 07817 687627. *[FCN=first clear night]*

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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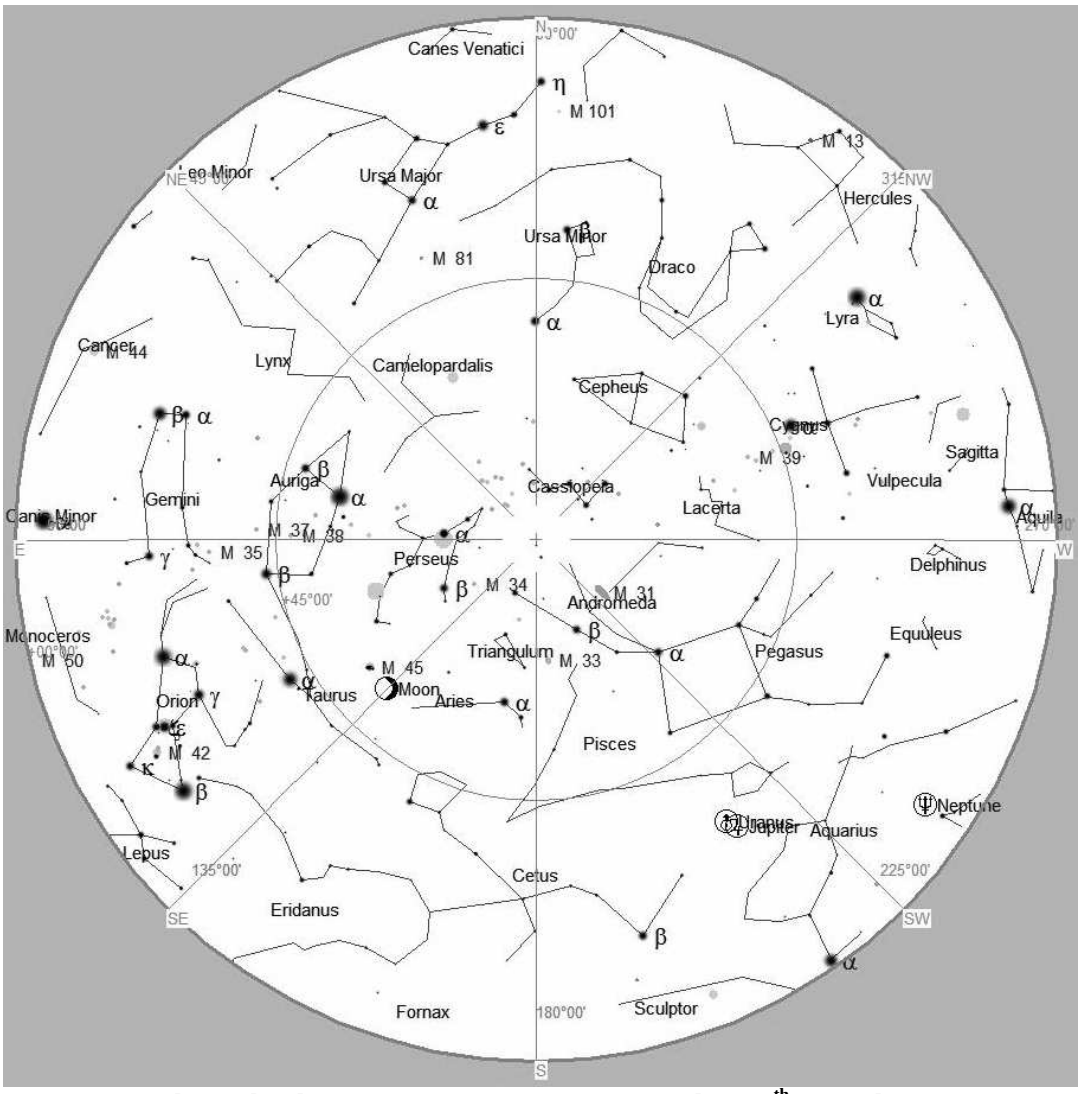
STAR CHART



The Night Sky at 21:00pm (GMT) next Saturday (19th December)

Orion has risen now – a sure sign that winter is here. Follow Orion's belt up and to the right to find the bright, reddish, Aldebaran, the eye of the Bull, Taurus. Further on are the Pleiades, or Seven Sisters.

You can't fail to miss brilliant Jupiter, almost due south. A small telescope will reveal its four major satellites (see below). Uranus is very close by and you could try looking for this in a small telescope.

Jupiter and its satellites at 9pm GMT on Saturday 19th December, 2010.