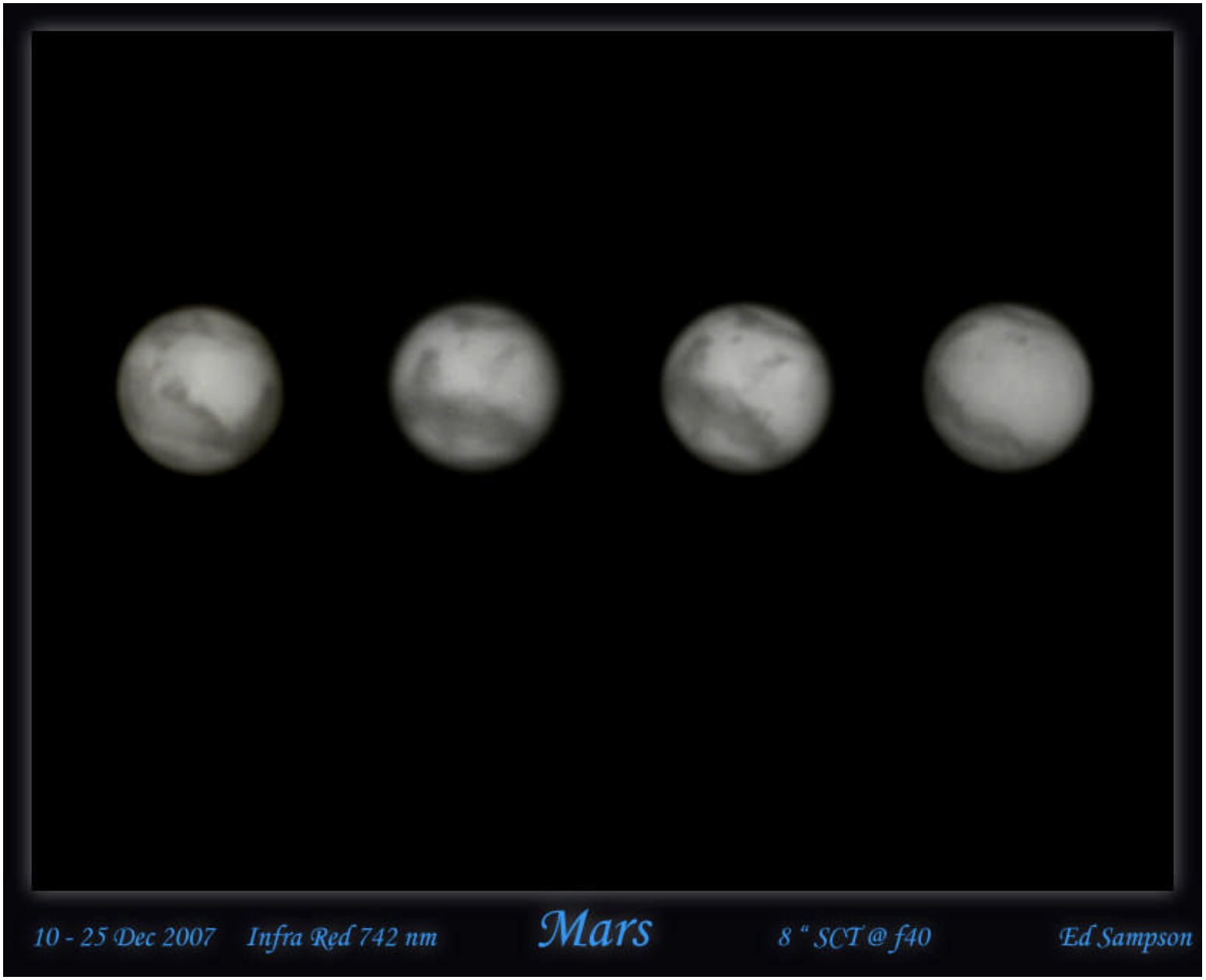
WAS NEWS

Monthly Newsletter of the **W**orthing **A**stronomical **S**ociety
www.was.org.uk

Number 215 **January 2008**



Mars

Ed Sampson

Mars through December 2007. Captured in Infra Red with an 8" SCT, BW camera,IR Pass filter and a 4x Barlow. Apart from the telescope all the equipment used will cost no more than £130 and will produce images of equal quality. All you need to do is switch your webcam to b/w and use a 6-8 inch scope combined with an inexpensive Barlow and some patience.

ALMANAC

All times U.T.

All times U.T.
January/February

LUNAR

January	Date	Time	Rise	Set
Apogee	3rd	08.11	405,298km	
New moon	8th	11.37	08.37	15.48
First Quarter	15th	19.46	10.30	**.**
Perigee	19th	08.41	366,455km	
Full Moon	22nd	13.35	16.20	08.11
Last Quarter	30th	05.03	01.25	10.02
Apogee	31st	04.27	404,493km	
February				
New moon	7th	03.44	08.01	18.53
Perigee	14th	00.56	370,256km	
First Quarter	14th	03.33	09.40	02.03
Full Moon	21st	03.30	18.05	07.09
Apogee	28th	01.25	404,403km	
Last Quarter	29th	02.18	02.41	09.23

EARTH

January	Sunrise	Sunset
8th	08.04	16.10
15th	08.00	16.20
22nd	07.53	16.31
30th	07.43	16.45
February		
7th	07.30	17.00
14th	07.17	17.12
21st	07.04	17.25
29th	06.47	17.39

PLANETS

(As at February 7th)

	Constellation	Rises	Sets	Mag.
Mercury	Aquarius	07.05	17.03	+4.4
Unsuitably placed. Evening apparition 21st— 26th. Jan.				
Venus	Sagittarius	06.03	14.15	-4.0
Morning object in the south-east				
Mars	Taurus	11.52	05.07	-0.4
Fading quickly				
Jupiter	Sagittarius	05.44	13.42	-1.9
Unsuitably placed				
Saturn	Leo	18.30	08.28	+0.3
Visible most of the night				
Uranus	Aquarius	08.33	19.41	+5.9
Unsuitably placed				
Neptune	Capricornus	07.41	17.18	+8.0
Unsuitably placed				
Pluto	Sagittarius	04.21	13.29	+14.0
Unsuitably placed				

PHENOMENA

Day	Hour	January
20th	00	Mars 1°S. of moon
22nd	05	Mercury at greatest elongation
25th	04	Saturn 3°N. of moon
28th	21	Mercury at stationary point
30th	23	Mars at stationary point
		February
1st	12	Jupiter 0°.6 S. of Venus
4th	06	Jupiter 4° N. of moon
4th	12	Venus 4° N. of moon
6th	18	Mercury in inferior conjunction
7th	02	Mercury 5° N. of moon
7th	04	Annular eclipse of Sun
11th	02	Neptune in conjunction
16th	08	Mars 2° S. of moon
19th	03	Mercury at stationary point
21st	03	Total eclipse of moon
21st	10	Saturn 3°N. of moon
24th	10	Saturn at opposition
26th	18	Venus 1° S. of Mercury

Minima of Algol

January 21st 17.00 30th 07.24

February 2nd 04.18 5th 01.06 7th 21.54 10th 18.42 22nd 06.00 25th 02.48 27th 23.42

Lunar Occultation's

Times as at NEW W.A.S. Observatory site

Date	U.T.	S.A.O. No	Mag	Phase
January	**h. m. s.**			
24th	23.03.27	118286	5.9	Reapp
24th	23.12.46	118292	7.7	Reapp
26th	23.51.56	138520	7.3	Reapp
28th	05.22.25	157550	6.5	Reapp
29th	03.31.05	157998	5.6	Reapp
February				
9th	18.54.45	146735	7.1	Diss
11th	19.53.22	92313	8.6	Diss
11th	20.01.47	92317	8.5	Diss
12th	19.23.56	92787	8.9	Diss
12th	21.00.49	92808	8.8	Diss
13th	18.20.59	75686	9.2	Diss
13th	19.00.05	75699	8.1	Diss
13th	21.47.51	75746	9.5	Diss
14th	19.00.01	76407	8.1	Diss
14th	20.32.51	76460	8.0	Diss
14th	21.30.18	76472	8.6	Diss
15th	20.08.27	76984	8.9	Diss
15th	20.23.47	76998	6.9	Diss
16th	17.59.23	78041	8.0	Diss
16th	19.38.51	78018	8.8	Diss
16th	22.22.29	78196	6.7	Diss
16th	22.57.46	78218	8.4	Diss
16th	23.33.16	78241	8.8	Diss
17th	18.23.57	79172	6.9	Diss
17th	23.50.49	79352	5.1	Diss
18th	21.46.33	80087	8.0	Diss
22nd	21.27.00	138298	4.3	Reapp

The list above is a selection of the more easily observed evening events, (about 18 % of the list available,) there are more in the wee small hours for the insomniacs amongst us

Dave Wells

Editors Note

May I be at least the 128th person to wish you a Happy New Year!

I hope that your festive season was as least as enjoyable as mine, as I had a jolly fine time. Plotting Santa's route via NORAD has never been so much fun.

Anyway, onwards and upwards we go as we switch on the ion engine which is WASNews for another 11 info packed issues.

Please do not adjust your set.

Rob

Constitution Amendment

As per the Constitution -the Executive Committee are proposing an alteration to the constitution:
4.2 Members in categories 4.1.1-4.1.3 and 4.1.5 shall be know as 'Voting Members' and shall have full voting rights, except where voting on subscription issues where members in 4.1.5 shall not have a vote. Members in categories 4.1.4 will not be 'Voting Members' and will not have voting rights.

As per the constitution a vote regarding this alteration shall take place at the next monthly meeting (February)."

Reports

Solar Section Report - December, 2007

Brian Halls - Solar Section Director

After a relatively spotless month in November, sunspot activity increased a little during December.

Spots returned to the Sun during the first weeks of the month, all but one situated in the southern solar hemisphere, close to the equator.

Of them, AR 0978 ($S07^0$) proved to be the most magnetically active group - forming a large Jupiter sized circular cluster of small spots. It remained well situated and changed little until it past over the CM when it began to decay before slipping over the western limb and disappeared from view on the 18th.

While 0978 was decaying, signs that new solar cycle 24 were beginning to stir. Though not a sunspot, a reverse polarity magnetic area was observed at $N27^0$ by professional observatories - though it decayed and disappeared quickly.

It comes as no surprise that new cycle sunspots might appear in the northern solar hemisphere as the last 18 months or so has seen little sunspot activity at all in that part of the solar disk - the northern hemisphere reaching minimum before the southern.

For the remainder of the month, no sunspots were observed.

Three members reported solar observations on 21 days this month - Graham Boots on 19 days, Brian States on 18, and the director on 6.

December R= 10.5 (R_i = 10.1) MDF = 0.42

December Lecture Reviewed – Report by Graham Boots

Nuclear Fusion: The Sun's Power on Earth

Jim Swift

Our speaker for the evening was Jim Swift of Crawley Astronomical Society where he is the secretary. Jim is not a physicist, but a retired electronic development engineer. The chairman of Crawley society, Neil Morrison, accompanied him.

Jim's Microsoft PowerPoint presentation plus video contained photographs and material taken by him or provided mainly by Dungeness fission power stations and the fusion development centre at Culham near Oxford.

Jim began by mentioning J.J. Thomson who in 1897 split the atom and discovered the electron using his cathode ray tube experiments. Before this, the atom was thought to be indivisible. Without Thomson's discovery, televisions would not exist. After Thomson's discovery, Ernest Rutherford's experiments led to the theory of atomic structure finding that atoms are mainly empty space.

It was the astronomer, Sir Arthur Stanley Eddington, who in the 1930s first understood how the power of the Sun was proportional to mass and proved yet another of Einstein's theories correct.

By 1945, we had the atom bomb based on nuclear fission follow by the hydrogen bomb based on nuclear fusion. The fission process has been used in power station for the last forty years.

Jim then went on to discuss the fission reactors A and B at Dungeness on Romney Marsh on the Kent coast. Dungeness A ceased operations in 2006 and is now being

decommissioned. Dungeness B has an electrical output of 1110 mega watts and is cable of supplying over 1.5 million homes. It is scheduled to operate until 2018. These power stations have operated safely and successfully since the early 1960s and are much cleaner that coal fired power stations. The fuel rods have a useful life of about five years although the outer rods last longer. Basically, nuclear power stations have just three parts, the nuclear reactor, the electrical generator and the water cooling system. They are built for safety reasons on sparsely populated coastal areas and for the need of seawater for cooling purposes.

Dunaeness A

In 1956 when receiving a lecture in the UK from a Russian physicist, it was soon realized that the Russians had a deeper understanding of nuclear fusion processes. Than Britian and that our

Dungeness B

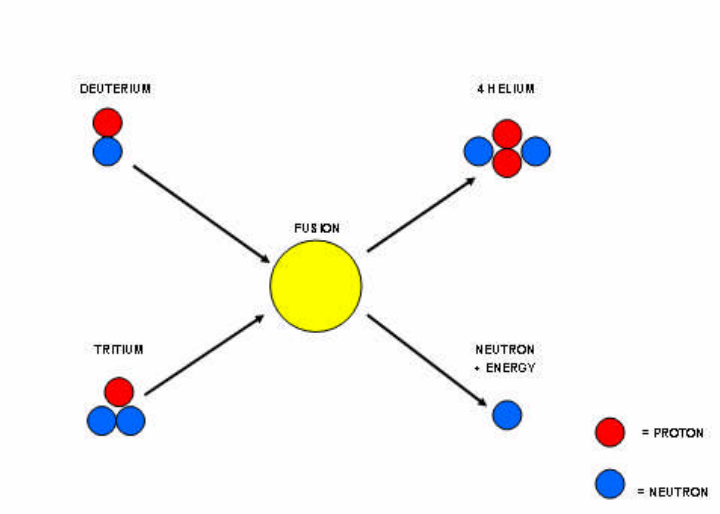
knowledge was behind. Ever since Russia, USA, China and the UK have agreed to share the available technology. Over the years, many other counties have joined to share the work and future benefits and costs.

The nuclear fusion process is based on the lightest elements: hydrogen, helium and lithium whereas fission is based on the heaviest of the natural elements such as uranium. In today's fission reactors uranium allowed in a contained and controlled way to split into two and occasionally three lighter elements. It is this process that creates heat to create steam to drive turbines that provides electricity.

Nuclear fusion is the process powering the Sun and stars. In the core of the Sun at temperatures of 10-15 million degrees Kelvin, Hydrogen is converted to Helium by fusion. This process provides enough energy to keep the Sun burning for 10 billion years and coupled with other stabilizing forces and conditions of the space environment allow life to evolve here on Earth.

A vigorous worldwide research programme is underway, aimed at harnessing fusion energy to produce electricity on Earth. If successful, this will offer a viable alternative energy supply within the next 30-40 years, with significant environmental, supply and safety advantages over present energy sources.

In Jim's lifetime, the human population of the Earth has trebled. At worldwide current energy consumption levels, we only have enough coal left for 220 years, natural gas for 60 years, and oil for 40 years. At present nuclear energy supplies just 7% of our energy needs while oil supplies one third, coal one quarter and gas one fifth. Of the total energy consumed 50% is for mobile use ie., transportation and 50% is for static use ie., homes, offices and factories. Currently we are putting 1,000 tones per second of carbon dioxide into our atmosphere.



To harness fusion on Earth different, more efficient fusion reactions than those at work in the Sun are researched. These are those between the two heavy forms of hydrogen, deuterium and tritium. These are isotopes of hydrogen. All forms of hydrogen contain one proton and one electron. Protium, the common form of hydrogen has no neutrons, deuterium has one neutron, and tritium has two. If forced together, the deuterium and tritium fuse and then break apart to form a helium nucleus (two protons and two neutrons, an alpha particle) and an unchanged neutron. The excess energy from the fusion reaction is mostly contained in the free neutron, making it a high-energy neutron. Ideally, alpha particles will expend their energy in the plasma, further heating it. The only waste product is helium.

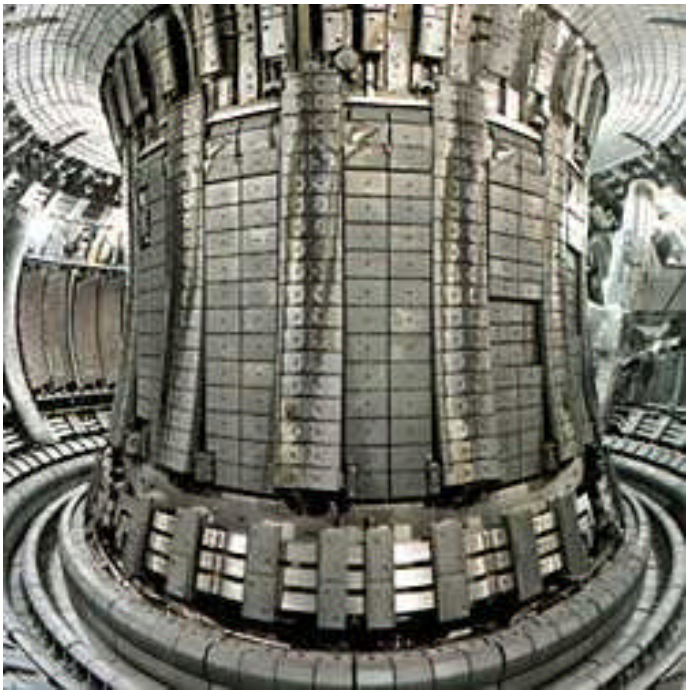
While in fact nearly all stable isotopes lighter on the periodic table than iron will fuse with some other isotope

and release energy, deuterium and tritium are by far the most attractive for energy generation as they require the lowest energy to do so.

Fusion occurs at a sufficient rate only at very high energies (temperatures) On Earth temperatures greater than 100 million Kelvin are required. At these extreme temperatures, the deuterium – tritium gas becomes a plasma, which is a hot electrically charged gas. In order to harness fusion energy, scientist and engineers are learning how to control very high temperature plasmas.

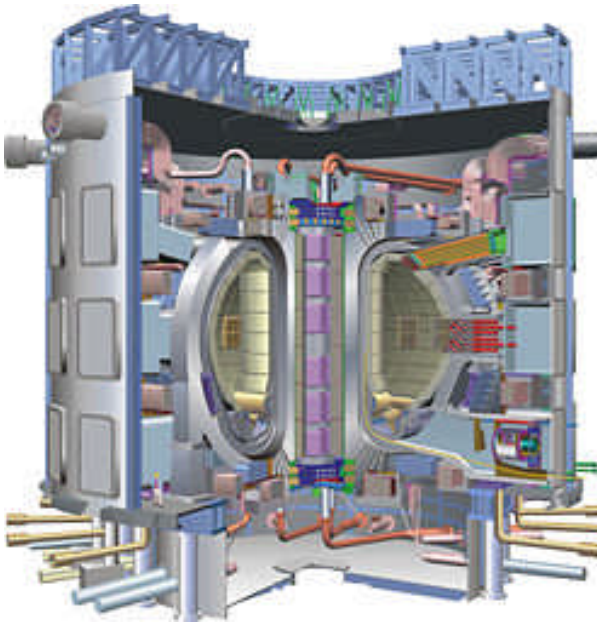
Because plasmas have magnetic properties, it may become viable to contain hydrogen plasmas using magnetic fields within large scale commercial generators.

In the UK at Culham near Oxford, there is a fusion development centre. JET, the Joint European Torus, is the flagship of the European Community Fusion Programme. The experiment is based at Culham Science Centre, and the work is being carried out by a team of scientists from the EU counties. Other international scientists also participate in the programme.



Joint European Torus

European fusion research will have a new establishment at Cadarache in Southern France that Jim said would start operation about 2009. This will a be a large-scale international consortium consisting just about all the major nations. It will be known by the acronym, ITER and will attempt to produce 500 MW of fusion power sustained for up to 400 seconds compared to JET's peak of 16 MW for less than a second.



Technical Cutaway of the ITER Tokamak. Torus encasing. Note the human figure in

ITER will run in parallel with a materials test facility, the International Fusion Materials Irradiation Facility (IFMIF), which will develop materials suitable for use in the extreme conditions that will be found in future fusion plants. Both of these will be followed by a demonstration power plant, DEMO that would generate electricity. DEMO would be the first to produce electric energy for commercial use by around 2040.

Fusion power offers the opportunity to solve not only mankind's thirst for power but also the opportunity to prevent man made global warming. We also have unlimited cheap fuel source with hydrogen. However, it is not without its criticism. Personally, I feel we should pursue not only fusion power but renewal energy sources as well, such as wind, wave, tidal and of course solar (heat exchanger panels).

Jim gave a well illustrated and thought provoking lecture that gave rise to many questions and warm applause at the close.

Articles

Horace Parnell Tuttle 1837-1923

Jan Young - Historical Section Director

Born in March 1837, Horace Parnell Tuttle entered Harvard College Observatory in 1857 as a student under the directorship of William Cranch Bond. He followed in the footsteps of his elder brother Charles Wesley Tuttle (1829-1881) who had been there until 1854. While at Harvard he regularly swept the skies for comets using the observatory's 4" Merz Comet Seeker Telescope. He was rewarded by several discoveries

including Comet 8/PTuttle, discovered in January 1858 and currently visible in our skies. Although it was named after Tuttle in recognition of his discovery, it had actually been previously seen and noted in January 1790 by the French astronomer Pierre Mechain and by Charles Messier and William Herschel, but poor weather conditions prevented its being observed enough to calculate an accurate orbit.

At the time of its1858 discovery, Tuttle described it as a 'faint, very large diffuse object without a nucleus and distinct border'. A German astronomer Karl Bruhns also claimed the honour of discovery but observations confirmed that the credit was that of Tuttle. The distance and period (just over 13 years) of this comet was computed by Charles Wesley Tuttle now at Newbury and it was he who realised that the 1790 and 1858 comets were one and the same. It was predicted that it would return in 1870 which it did and it was seen by several observers including Horace Parnell Tuttle on 22nd October. Except for 1953 when it was in an unfavourable position, Comet Tuttle 1858 has been observed at every return since its1858 'discovery'.

Horace Tuttle left Harvard in 1862 to join the American Navy during the US Civil War but he was dismissed after only nine months due to some rather dubious financial actions. After joining several geological expeditions, he eventually joined the US Naval Observatory, Washington in 1884, meeting up once again with his former colleague, Asaph Hall. He died in poverty in August 1923 and was buried in an unmarked grave.

WAS Ad

What's on the Box

Tuesday 22 January 2008

03.40 – 04.10: **The Sky at Night**

A Spin around The Sun. Patrick Moore offers advice on how to observe the sun and its many brilliant features. Chris Lintott demonstrates how to split light into a spectrum.

Sunday 27 January 2008

13.30 – 14.00: **The Astronaut Wives Club**

At the height of the Apollo space programme of the 1960s, many air force and navy pilots considered that their selection as astronauts was largely based upon the success of their marriage. But the astronauts' wives frequently led a fraught and lonely existence, as their previously untold stories show.

WASNews News

'Death Star' galaxy black hole fires at neighbour

NASA News Release

A powerful jet from a super massive black hole is blasting a nearby galaxy, according to new findings from NASA observatories. This never-before witnessed galactic violence may have a profound effect on planets in the jet's path and trigger a burst of star formation in its destructive wake.

Known as 3C321, the system contains two galaxies in orbit around each other. Data from NASA's Chandra X-ray Observatory show both galaxies contain super massive black holes at their centers, but the larger galaxy has a jet emanating from the vicinity of its black hole. The smaller galaxy apparently has swung into the path of this jet.

This "death star" galaxy was discovered through the combined efforts of both space and ground-based telescopes. NASA's Chandra X-ray Observatory, Hubble Space Telescope, and Spitzer Space Telescope were part of the effort. The Very Large Array telescope, Socorro, N.M., and the Multi-Element Radio Linked

Interferometer Network (MERLIN) telescopes in the United Kingdom also were needed for the finding.

This composite image shows the jet from a black hole at the center of a galaxy striking the edge of another galaxy, the first time such an interaction has been found. X-rays from Chandra (colored purple), optical and ultraviolet (UV) data from Hubble (red and orange), and radio emission from the Very Large Array (VLA) and MERLIN (blue) show how the jet from the main galaxy on the lower left is striking its companion galaxy to the upper right. Credit: X-ray: NASA/CXC/CfA/D.Evans et al.; Optical/UV: NASA/STScI; Radio: NSF/VLA/CfA/D.Evans et al., STFC/JBO/MERLIN

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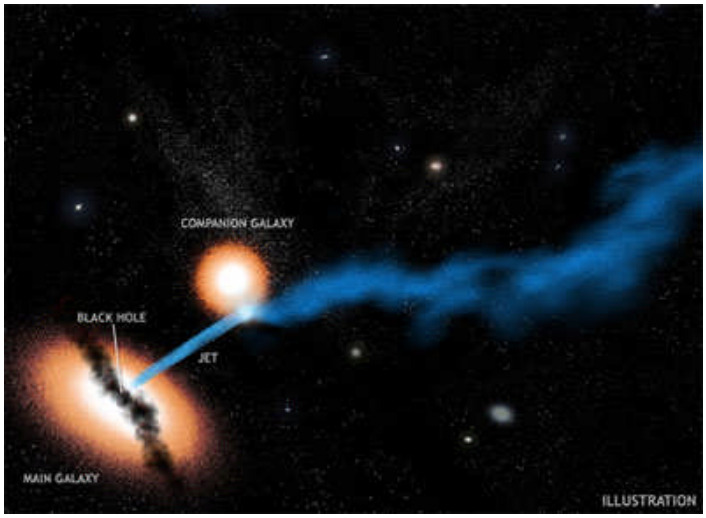
"We've seen many jets produced by black holes, but this is the first time we've seen one punch into another galaxy like we're seeing here," said Dan Evans, a scientist at the Harvard-Smithsonian Center for Astrophysics and leader of the study. "This jet could be causing all sorts of problems for the smaller galaxy it is pummeling."

Jets from super massive black holes produce high amounts of radiation, especially high-energy X-rays and gamma-rays, which can be lethal in large quantities. The combined effects of this radiation and particles traveling at almost the speed of light could severely damage the atmospheres of planets lying in the path of the jet. For example, protective layers of ozone in the upper atmosphere of planets could be destroyed.



An artist's illustration of the system, showing the main galaxy and the companion galaxy. A jet of particles generated by a supermassive black hole at the center of the main galaxy is striking the companion galaxy. The jet is disrupted and deflected by this impact. The key features of this system are labeled in the final view. Credit: NASA/CXC/M. Weiss

Jets produced by super massive black holes transport enormous amounts of energy far from black holes and enable them to affect matter on scales vastly larger than the size of the black hole. Learning more about jets is a key goal for astrophysical research.

"We see jets all over the universe, but we're still struggling to understand some of their basic properties," said co-investigator Martin Hardcastle of the University of Hertfordshire in the United Kingdom. "This system of 3C321 gives us a chance to learn how they're affected when they slam into something like a galaxy and what they do after that."

The effect of the jet on the companion galaxy is likely to be substantial, because the galaxies in 3C321 are extremely close at a distance of only about 20,000 light years apart. They lie approximately the same distance as Earth is from the center of the Milky Way galaxy.

A bright spot in the Very Large Array and MERLIN images shows where the jet has struck the side of the galaxy, dissipating some of the jet's energy. The collision disrupted and deflected the jet.

Another unique aspect of the discovery in 3C321 is how relatively short-lived this event is on a cosmic time scale. Features seen in the Very Large Array and Chandra images indicate that the jet began impacting the galaxy

about one million years ago, a small fraction of the system's lifetime. This means such an alignment is quite rare in the nearby universe, making 3C321 an important opportunity to study such a phenomenon.

It is possible the event is not all bad news for the galaxy being struck by the jet. The massive influx of energy and radiation from the jet could induce the formation of large numbers of stars and planets after its initial wake of destruction is complete.

The results from Evans and his colleagues will appear in The Astrophysical Journal. NASA's Marshall Space Flight Center, Huntsville, Ala., manages the Chandra program for the agency's Science Mission Directorate. The Smithsonian Astrophysical Observatory controls science and flight operations from the Chandra X-ray Center in Cambridge, Mass.

Diary

21 January 2008 New Year Social Buffet. The Committee is treating member's to this spread also games, quiz, raffle and other jovialities. Plus member's observing contributions

18 February 2008 Astro Photography - Making Every Photon Count - Steve Richards

17 March 2008 Stars: Origin and Evolution – Dr Serena Viti Department of Physics and Astronomy University College London

21 April 2008 Member's Evening - Results of their work and short talks reflecting their own special interests in various branches of astronomy

19 May 2008 TBA

16 June 2008 Remote Observing - Lilian Hobbs Southampton Astronomical Society

*All meeting **(bold)** are held on the 3rd Monday of every month (except August when we normally have a bar-b-que at a member's home) at Emmanuel United Reform Church Hall on the corner of Heene Road and St., Michael's Road, Worthing beginning 7.30 p.m. Meetings include the latest astronomical work, reports and images by members. For further details contact us by Internet at www.was.org.uk or email chairman@was.org.uk*

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Note to Contributors

Contributions & Correspondence for the **February** issue of WAS NEWS should be with the Editor by the **end of the first full week of that month**. All material for inclusion should be sent to the Editor.

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