

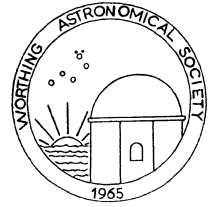


# WAS NEWS

Monthly Newsletter of the Worthing Astronomical Society

Official website: [www.was.org.uk/](http://www.was.org.uk/)

Affiliated websites: [www.observatory99.freeserve.co.uk](http://www.observatory99.freeserve.co.uk)



Number 158

November 2002

## ALMANAC

All times U.T.

### November./ December.

#### LUNAR

Month	Date	Time	rise	set
November	New moon	4th	20.34	06.06
	First Quarter	11th	20.52	13.53
	Full Moon	20th	01.34	16.19
	Last Quarter	27th	15.46	23.19
	December			
December	New moon	4th	07.34	08.01
	First Quarter	11th	15.49	12.54
	Full Moon	19th	19.10	16.12
	Last Quarter	27th	0031	**:**

1st	15	Venus 2°S. of moon
4th	6-9	Total eclipse (Southern hemisphere)
4th	12	Jupiter at stationary point.
5th	04	Mercury 0.6°S. of moon
7th	01	Venus at greatest brilliancy
9th	17	Pluto in conjunction
17th	17	Saturn at opposition
19th	15	Saturn 3°S. of moon

#### EARTH

Month	Date	Sunrise	Sunset
November	4th	06.59	16.28
	11th	07.11	16.17
	20th	07.26	16.05
	27th	07.37	15.58
December	4th	07.47	15.53
	11th	07.56	15.51
	19th	08.02	15.52
	27th	08.06	15.57

#### Minima of Algol

November	16th	06.06	19th	03.00	21st	23.48
	24th	20.36	27th	17.24		
December	9th	04.42	12th	01.30	14th	22.18
			17th	19.06		

#### PLANETS

(as at November 27th.)

Planet	Constellation	Rises	Sets	Mag.
<b>Mercury</b>	Ophiuchus	08.26	16.14	-0.8
Too close to the Sun for observation				
<b>Venus</b>	Virgo	04.26	14.39	-4.6
Morning object visible in the East				
<b>Mars</b>	Virgo	04.05	14.35	+1.7
Morning object visible in the East				
<b>Jupiter</b>	Leo	21.32	12.26	-2.3
Morning object visible in the south-east				
<b>Saturn</b>	Taurus	17.20	09.29	-0.3
Visible most of the night				
<b>Uranus</b>	Capricornus	12.34	22.20	+5.8
Unfavourable				
<b>Neptune</b>	Capricornus	11.51	20.49	+7.9
Unfavourable				
<b>Pluto</b>	Ophiuchus	07.50	17.38	+13.9
Unfavourable				

#### Lunar Occultations

Times as at W.A.S. Observatory

Date	U.T.	S.A.O.No	Mag	Phase
<b>Nov</b>	<b>h. m. s.</b>			
15th	20.37.34	128845	8.9	diss
15th	23.44.12	128873	9.1	diss
16th	00.23.01	109356	8.6	diss
22nd	21.01.15	78069	8.2	reapp
22nd	21.03.51	78091	8.7	reapp
22nd	21.07.47	78097	8.9	reapp
22nd	21.15.48	78081	8.3	reapp
22nd	21.41.12	78100	8.9	reapp
22nd	22.46.29	78132	8.2	reapp
22nd	22.55.14	78146	7.5	reapp
27th	01.19.31	98955	3.5	diss
27th	02.22.54	98955	3.5	reapp
<b>Dec.</b>				
6th	16.24.34	187716	7.0	diss
7th	16.59.01	188976	7.2	diss
7th	17.03.38	188977	7.2	diss
7th	17.23.00	188985	8.2	diss
8th	17.50.13	190033	9.2	diss
8th	17.51.59	190040	7.7	diss
8th	18.45.20	190054	9.1	diss
10th	17.31.54	165298	5.7	diss
10th	17.31.54	165310	8.5	diss
10th	18.45.37	165310	8.5	diss

This is only about 14% of the predictions for the W.A.S. observatory.

Dave Wells

#### PHENOMENA

Day	Hour	Phenomenon
<b>November</b>		
14th	05	Mercury in superior conjunction
21st	07	Venus at stationary point
22nd	12	Saturn 3°S. of moon
26th	10	Jupiter 4°S. of moon
<b>December</b>		
1st	11	Mars 2°S. of moon

## *Editors Note*

Evening all! How these months slip away, is it really Christmas in 42 days time, 'The horror, the horror'. It also seems like no time at all since the last AGM and here we are once again – so cough up your subs and feast your eyes on who's doing what with whom in WAS.

Rob

### Worthing Astronomical Society – AGM

#### *2002 ~ 2003 Line up*

##### Executive Committee

Chairman	Brian Hall
Secretary	<b>Post Vacant</b>
Treasurer	Mike Marshall
Vice Chairman	Bob Turner
Assistant Secretary	David Chilard

##### Other Posts

Curator	Graham Boots
WAS News Editor	Rob Davis
Auditor	Dave 'Doc' Sutton
Librarians	Dave & Linda Story
Web Site Manager	Ryan Thomas
Evening Class	Kelvan Gale
Refreshments	Kay Smith

##### Section Directors

Astronautics	Nick Quinn
Astrophotography	Alex Vincent
Comets	Alex Vincent
Variable Stars	Alex Vincent
CFDS	Pam Spence
Deep Sky	Graham Boots
History	<b>Post Vacant</b>
Instruments	Bob Turner
Lunar	Glen Thomas
Planets	Glen Thomas
Solar	Brian Halls

### Chairman & Secretary's Report

The society continues to grow. Though membership tailed off at the start of the society year, we continued to take on members through the last session, all of whom showed interests in varying aspects of astronomy.

At monthly meetings we have a varied list of interesting speakers, many of whom were returning to speak to us after a period of some years – in November, Alan Drummond came and spoke to us the subject of *Comets Past and Present*; in December we had Norman Walker speaking on the subject of *The beginnings of astronomical knowledge* – while in February Peter Gill came and spoke to us on a near-by neighbour of ours, *The Moon*.

Another returning speaker, Neil Bone, who talked about the subject of *The Aurora*, followed this in March. Dr David Brand spoke in April about *The Planet Vulcan*. Sadly our speaker for May was unable to attend, but a series of short pieces from members filled the evening, while in June we were pleased to have Kevin Apps come and speak to us on *The Search for Extra-solar planets* – something our speaker could speak with a certain amount of confidence as he had discovered 10 such planets orbiting other stars.

In July we had a scheduled *Members Evening* where members again spoke on a variety of different and interesting, astronomical subjects.

The Society then had its annual summer break with no meeting in August, but in September – last month, our guest speaker was Dr David Whitehouse who spoke on *The Moon: A Biography*.

As you can no doubt see, we had a variety and broad spectrum of talks that I hope appealed to our members.

Throughout the year, we have not had a proper Secretary; instead as Chairman I have taken on the role as *Acting Secretary* – because no two Executive Committee officers may occupy more than one Executive position – however, I would like to take this opportunity to thank Graham Boots who has helped me by taking on the unofficial role as Meetings Secretary, being responsible for the arranging of speakers through the year. I am sure you will agree with me that the calibre of speaker we have had is a tribute to his work.

I would also like to take this opportunity to thank everyone else that has helped in the running of the Society. Where would we be without a Treasurer? Michael Marshall has performed an outstanding task in this position and, along with our Auditor Dave 'Doc' Sutton, has kept the accounts in a nice healthy condition.

David Chilard as Assistant Secretary has helped with the task of keeping minutes of the committee meetings, while many thanks to Bob Turner as vice-chairman who has stood in for me in the past.

There are other members such as the section directors who keep us all updated on what is happening in astronomy each month with their reports, while many thanks to Rob Davis for looking after our society's official newsletter, WASNews; thanks to Vanessa Wegner who writes up the monthly meeting reports which appear therein. Thanks also to Graham Darlington who organises the photocopying, collating, and stapling of the newsletters so they are already for distribution at the monthly meeting. And if you miss the monthly meeting, Robert Kasproicz is the member who mails out the newsletters. Other members who help things run smoothly are Linda and Dave Storey who have undertaken the running of the library and Ryan Thomas who runs our society website.

At the half-way point in our monthly meetings, usually after the main talk of the evening, we normally have a tea-break and I would like to thank Kay Smith who organises all this for us and those numerous members who have over the last year have helped with the making of tea and, importantly, the clearing up of it all after.

The society has just recently sponsored a leg of the John Dobson tour when this distinguished amateur astronomer came to speak at Chichester. This successful event was arranged and organised by Nick Quinn.

Did you know this year was National Science Year? I did not! I only learnt it reading the Objective section of the current (October issue of *Astronomy Now*). In that interesting and thought provoking article, Dr Paul Roche notes that the general public know very little about astronomy, except what they may read about a spectacular eclipse, a near miss between Earth and an asteroid, or a bright comet. This coming year we in Worthing can play a small part in helping change that.

Our constitution states one of our aims is promoting an interest in astronomy and there is a lot going on in the year ahead that will help us a little in this promotion in the Worthing area. In November, the Society will be holding an exhibition at Worthing central library. In May there is a transit of Mercury visible from the UK which may be the only opportunity many people get to see of this planet - followed a week later by a total lunar eclipse - sadly occurring in the wee hours of the morning prior to sunrise; this is followed a fortnight later by an annular solar eclipse visible from Scotland, but which may generate some more public awareness but another, spectacular - the opposition of Mars in the late summer of 2003 coincides with National Astronomy Week. All these events can be utilised to increase the awareness of the astronomy in our locality.

There is plenty of things to look forward too in the field of astronomy - new discoveries, perhaps a bright comet will brighten up the sky, or even perhaps an aurora; interesting talks from speakers at the monthly meetings, observers nights at the observatory, perhaps some observing nights at the Ferring Beach site.

I am sure they will be something for everyone in the coming year - if you have any suggestions please let me or one of the other committee members know and we will see what we can do.

So all it needs from me is to wish you all clear and interesting skies for the coming year.

### *Dates for your Diary*

#### **Penumbral eclipse of the Moon.**

Alex Vincent

On the night of November 19/20 there will be a penumbral eclipse of the Moon. Times are as follows:

Eclipse begins: 23:32 UT  
Mid eclipse: 01:49 UT  
Eclipse ends: 04:01 UT  
Magnitude of eclipse: 0.886

This eclipse is Saros 116, which began as a 0.035 penumbral on March 10, 993 AD, became a 0.058 umbral on June 16, 1155 AD, and became total on September 21, 1317 AD. The last total took place on July 11, 1786, while the last umbral occurred on October 7, 1930 (0.029) and was a total penumbral on October 18, 1948. The last eclipse of Saros 116 will take place with a 0.064 penumbral on May 14, 2291.



Picture: the penumbral eclipse (Saros 116) one Saros earlier on November 8, 1984 ~ taken by Alex Vincent

## South Downs Planetarium

'*Voyage to Saturn*' November 15<sup>th</sup>, 21<sup>st</sup> 19.30; 17<sup>th</sup> 15.30.

'*Last Men on the Moon*' December 11<sup>th</sup>, 13<sup>th</sup>, 14<sup>th</sup>, 20<sup>th</sup> 19.30. 15<sup>th</sup>, 22<sup>nd</sup>, 15.30.

'*The Star of Bethlehem*' December 23<sup>rd</sup> at 15.30 & 19.30; 24<sup>th</sup>, 27<sup>th</sup> 15.30hrs

*Details from Acting Secretary.*

## *Reports*

### The Planets in November 2002

Glen Thomas ~ Planetary Section Director

We are now back to GMT, or UT, so as the clocks go back the planets rise an hour earlier. Jupiter and Saturn will be much more visible in the evening, while the lighter mornings mean rising earlier to spot the morning objects, Venus and Mars.

**Mercury** reaches superior conjunction on the 14<sup>th</sup> when it passes, this time, directly behind the Sun's disc. It is not observable this month.

**Venus** is visible before sunrise. It can be seen shining brightly 10-15° above the SE horizon early in the month, with the tiny disc of **Mars** visible 11° above and to the right. They come to within a couple of degrees of each other by early December with Venus blazing brightly, but Mars is six magnitudes (i.e. 300 times) dimmer.

**Jupiter** is high in the sky before dawn. Jupiter occults a magnitude 9 star in Cancer on the 16<sup>th</sup>, with it disappearing near Jupiter's equator at around 03:38, reappearing at 08:12. The star appears not to be a double, and should be bright enough to see fade rapidly as it moves behind the giant planet's atmosphere. (The star is SAO 98512 / TYC 1402-1027-1 / PPM 126354, RA 09h 21m dec +16° 8')

**Saturn** is now moving slowly westwards back into Taurus from Orion. It is now high enough in the sky to view clearly in the late evenings. The eighth magnitude moon Titan is 4 ring diameters east of Saturn on **19th Nov** and **5th Dec** and the same distance west on **27th Nov**.

**Uranus** and **Neptune** now set too early for easy observation.

**Pluto** is too low in the sky by the time the sky is dark enough to observe it, as it heads towards a December conjunction with the Sun.

## **Partial Penumbral Eclipse of the Moon**

The Moon passes through the Earth's shadow on the **19<sup>th</sup>/20<sup>th</sup>**, but will not reach the darkest part, the umbra. Instead it will mostly pass through the penumbra, but with the Moon coming closer to the umbra than during June's eclipse. It will not be dramatic, but the north pole of the Moon should show some darkening.

Moon enters penumbra: Nov 19 23:32

Maximum eclipse: Nov 20 01:46

Moon leaves penumbra: Nov 20 04:01

Penumbral magnitude: 0.886 (*only 0.235 in June*)

Duration of penumbral phase: 4h 29m

## *October Lecture(s) Reviewed*

As well as the AGM last month Bob Turner Glen Thomas and Brian Halls spoke.

Bob gave us a brief résumé of the newly discovered '10<sup>th</sup> Planet' – Quaoar, questioning whether it was in fact a planet at all or if it was just another piece (albeit very large piece) of surplus Solar System formation material. He promised to keep us advised with more information this month.

Glen presented us with a fascinating lecture entitled 'The Outer Planets' in which he took us on a step-by-step journey visiting the Solar Systems last three planets, their moons and other bodies.

Starting with Uranus we were told how Galileo almost 'discovered' it whilst observing Jupiter's moons. We had then to wait for the Pioneer & Voyager Spacecrafts before reasonable pictures were forthcoming. Although today both the Keck & VLT observatories offer magnificent views; to really view them in some considerable detail the Hubble Space Telescope is employed.

Glen then explained in some detail about the lack of knowledge surrounding both Uranus & Neptune's interiors, utilising various diagrams of the other planets magnetic fields he was able to show just how little is known about what goes on beneath both their opaque atmospheres. Aside from atmospheric wind speeds (up to 300m/s above Neptune) and a 'best guess' of chemical composition these Giants will for the foreseeable future remain shrouded in mystery.

Comparisons were drawn between Neptune's Moon Triton and Pluto once again adding weight to the 'Is Pluto a Planet at all?' argument. Could Pluto be just another stray body from the Kuiper Belt forever locked into a solar centric orbit by Neptune? It transpired that both

Glen & Bob's talks were linked, it seems that The Kuiper Belt was home to the latest Solar System member as well – The 10<sup>th</sup> Planet Quaoar.

A detailed and informative lecture was followed by a number of questions all of which were well fielded by Glen.

Brian's talk on his various trips to the Kennedy Space Centre in Florida along with his photographs gave all those who had never been (and those who had) a great opportunity to be amazed at the sheer size of the buildings & spacecraft on site.

For all those who remember the magic of the Apollo space missions Kennedy is a must see.

## *Notices*

### **James Leslie White F.R.A.S.,**

**1911 - 2002**

Obituary by Phyllis Randle, Wendy Dunkerley,  
Alex Vincent & Graham Boots



On the 13<sup>th</sup> September 2002 our president died peacefully in hospital at the Age of 91. He had been admitted to hospital six weeks earlier with an infection.

From the early 1960s Mr. White gave lectures on astronomy on behalf of the Adult Education Centre (Workers Education Association) in Union Place, Worthing. His courses attracted about a dozen pupils of

all ages and backgrounds and ran for three terms each year. He held similar courses in Brighton, Southampton and Morley College, Westminster that had an observatory and where he built a planetarium in the bell tower. He worked for the London Institute of Technology and gave astronomy lectures to children but left discipline to the schoolteachers and as a result the classes on occasions became unruly. As Mr. White's students some of us attended weekend residential courses, which he organized at Shornell's College in Abbey Wood near Greenwich in Kent and Lodge Hill near Pulborough, where we met students from his other courses. He also organized field trips for his classes, taking a 3" refractor and 6" reflector to a dark site in Findon and at the end of Worthing pier where he showed us the asteroid, Vesta (my sky diary contains an entry dated Tuesday 26<sup>th</sup> March 1963 for that evening and fifteen people were present, GB). When his Worthing astronomy course ceased in 1970 many of the students, about a dozen, joined Worthing Astronomical Society (WAS) when it was known as Newtonian Observatory Astronomical Society (NOAS); this doubled our membership and Mr. White was invited to be our president, a post he would occupy for 35 years. It became tradition for him to address WAS on the first Wednesday in June each year, which used to be Derby Day (horse racing) and this meant he could drive home more safely in the mid summer twilight to his home in Ewell, Epsom, Surrey. He attended most of our exhibition meetings that we held annually during the 70s and 80s. He also attended our 25<sup>th</sup> Anniversary celebration as guest of honour held at the Arlington Hotel, Steyne Gardens, Worthing in October 1990, and the opening of our new observatory building in September 1993. He thought highly of our society and gave gifts of his 3" Browning of London refracting telescope with six eyepieces and tripod for which our member, Charles Stiff made a brass alt/azimuth mount. He also gave us his set of Pythagorean regular solids and orbital rings made from heavy gauge steel wire by Mr.C.M. Myers, a member of his Brighton class.

His interest in astronomy came from reading 'Though My Telescope' by comedian Wil Hay who himself discovered a white spot on the planet Saturn in 1933. Mr. White joined the British Astronomical Association (BAA) in 1946 and was assistant secretary from 1970 to 78, acting librarian from 1973 to 78 and librarian from 1978 to 88. When books were return in a damaged condition he would express great annoyance. He received the Lydia Brown medal and gift in 1974 and was president from 1978 to 80. His title for his presidential address delivered in 1979 was 'Pythagoras'<sup>ref1</sup>. A particular paragraph from this address reflects his attitude towards astronomy and people and reads "It is those of our members who do nothing in the Association, but who gaze at the celestial bodies and wonder, as man has done since time

immemorial, who are my special concern this evening” He only demand was that people show an appreciation of the heavens. He was elected to membership of the Royal Astronomical Society in 1948 and was a regular contributor to specialist journals and books. He wrote each month ‘Night Sky’ articles for the Daily Telegraph for 25 years from 1965 to 1990. Although he made few notable observations himself, he was an excellent organiser and spokesman for astronomy.

He did not own a television but was an enthusiastic reader of the lives, work, beliefs and thoughts of Greek philosophers. He was a keen student of languages of which he could speak fifteen including Gallic and Maori. He was a man of strong religious beliefs, if eclectic and in his last 12 years attended a Welsh-speaking Anglican church at Sutton, south London.

After the death, in 1987 of his wife Anna Gray, who he called Nan and to whom he was married for 50 years, he moved into Abbeyfield sheltered housing in Ewell in 1994 from where he kept in touch with his many friends by telephone.

He loved his books and referred to them often during the course of his lectures. Such a book was ‘Astronomy for Amateurs’ by Camille Flammarion. He also recommend with great fondness the reading of ‘The Sleepwalkers’ by Arthur Koestler 1959.

In the early days of our society Mr. White gave strength and meaning to the purposes for which we were formed. He was a man of great talent and ability, yet humble, and was admired by many.

Four of our members attended his funeral at the North Surrey Crematorium on the 20<sup>th</sup> September 2002. About seventy people were present and much of the service was in Welsh.

It was typical that he should end his lectures with a philosopher’s quotation. His BAA presidential address ends: - “I am a child of the Earth and Starry Heaven” Does anyone know by whom this quotation was spoken?

22<sup>nd</sup> October 2002

Ref 1: Journal of the BAA February 1980 Vol. 90 No.2 Pages 115 to 131

#### *Editors Note*

The above quotation is only part of a Tomb Prayer from the Orphic religion of Ancient Greece, which illustrates various aspects of "Hellenistic dualism." the full prayer is as follows: -

You will find to the left of the House of Hades a spring,  
And by the side thereof standing a white cypress.  
To this spring approach not near.

But you shall find another, from the lake of Memory  
Cold water flowing forth, and there are guardians before  
it.

Say, "*I am a child of Earth and starry Heaven;*

But my race is of Heaven alone. This you know  
yourselves.

But I am parched with thirst and I perish. Give me  
quickly the cold water flowing forth from the lake of  
Memory."

And of themselves they will give you to drink of the holy  
spring:

And thereafter you will have lordship among the other  
heroes.

### Annual Fees

The annual membership fee is now due. Please make your  
cheques payable to Worthing Astronomical Society for  
the appropriate sum.

Ordinary Membership £14.00

Family Membership £21.00

Junior Membership £ 6.00

Student membership (as defined in the constitution) is  
free.

If you have not paid your membership subscription by the  
end of December, this shall be the last WASNews you  
will receive.

### *Articles*

#### What Time Is It?

Glen Thomas

We are used to treating GMT and Universal Time as the  
same thing, perhaps with a slight feeling of superiority  
that everyone else uses our reliable time standard, but are  
they the same thing? Does everyone agree on what ‘the  
time’ is? To measure time we need to observe and count  
regular events, but unless we agree on which events to  
look out for then different observers will get different  
values for important time units, such as the year or the  
second.

We are all taught at school that a year is the time it takes  
the Earth to come back to the same point in its orbit  
around the Sun, but different choices for that reference  
point affect our year length.

Choosing the equinox gives us the *Tropical Year*, 365.242  
19 days. Choosing fixed stars as the reference gives us the

*sidereal year* that is 20 minutes 24 seconds longer, since the position of the equinox moves across the fixed stars: useful for deep sky observers. Then there is the *anomalous year* measured from apse to apse, that is relative to the ellipse of the Earth's orbit which precesses slowly, which is about 5 minutes longer still, and the *eclipse year* measured from a node of the Moon's orbit, only 346.62 days long. It is simpler, perhaps, to focus on the rotation of the Earth for our measures of day and second.

The motion of the Sun across the sky (which gives us the *apparent solar time*) varies as the result of the non-circular orbit of the Earth, tidal effects of the Sun and Moon, variation in the Earth's geographical poles and the location of the observer. Allowing for the largest effect, the orbit of the earth, by the *equation of time* correction, we get the *mean solar time* or *local time*. As this assumes a constant rotation rate for the Earth, it is measured by reference to the fixed stars (*sidereal time*) and converted using a simple formula.

It is this *mean solar time* for Greenwich that is the basis of GMT (*Greenwich Mean Time*). GMT started at noon and was originally signalled, by the falling ball on the roof of the Greenwich observatory, for the ships on the Thames to correct their chronometers. In 1925 this was changed to midnight and was renamed UT, *Universal Time*, by the International Astronomical Union to avoid confusion, but as it was still determined by astronomical observations, corrections have to be made to make a uniform and reliable time scale.

The uncorrected mean solar time is called UT0, with UT1 and UT2 the results of different corrections for Earth's motion of the order of a few thousandths of a second.

In 1967 an international agreement defined the second, not as a fraction of a particular year, but as the duration of 9,192,631,770 periods of a particular vibration of the caesium-133 atom; the atomic clock took centre stage. Caesium atomic clocks are wonderfully regular timepieces. By looking at how different clocks diverge it is estimated that they might gain or lose a second in three million years! The average of 260 atomic clocks worldwide provides TAI, *International Atomic Time*, which is not referenced in any way to the Earth's motion. The *atomic second* was defined to be equal to the ephemeris second within the accuracy of the measurements, but since 1967 TAI and GMT have got more and more out of step, currently over 30 seconds! So, TAI is of little use to astronomers and navigators, to name a few.

In 1972 UTC, *Coordinated Universal Time*, was born for the use of the scientific community. It counts seconds as

measured by the TAI atomic clocks, but is kept to within a second of UT1 (approx. GMT) by the insertion of leap seconds at the end of July or December each year when necessary. TAI was exactly 32 seconds ahead of UTC by mid-2002.

So, is GMT the basis for the international time standard? Well, it was once, but the reliance is now the other way round. The 60 kHz signal transmitted from Rugby broadcasts UTC, along with the fraction of a second that must be added to get UT1 sent in code, giving us the choice of two time standards! But that is not all. While UTC should be used for scientific work of high precision, UK civil time is still based on GMT, unlike many other countries, so we should use the astronomically based UT.

But which version of UT? The National Physical Laboratory (NPL, in Middlesex) is the custodian of UK time standards through its association with TAI. NPL says, "Authorities are not agreed on whether GMT equates with UT0 or UT1", so I hope that clears things up! That gives us the choice of UTC directly from the time signal, which is definitely *not* GMT, or UT1 using the coded correction, which *may* be GMT.

So, what time is it? At least here in the UK, nobody is quite sure!

### **A Brief History Of Cosmology ~ How scientists, ancient and modern, have viewed the Universe.**

John Dobson

Newton had a cosmological problem introduced by combining his universal gravitation with his inverse square law. In order to avoid infinite gravitational problems, Newton's Universe had to be finite in an infinite ocean of space. That is, it had to have a centre.

But that contradicts the cosmological principle that the Universe should look the same from any position.

Then the astronomer Seeliger pointed out that the Universe could still be infinite if we allow that over very large distances the gravitational attraction between bodies falls off more rapidly with distance than with Newton's inverse square law. (This suggestion of Seeliger's is the famous cosmological term that Einstein used and later regretted.)

In order to preserve the notion that "There exists an average density of matter in the whole of space which is everywhere the same and different from zero," and to preserve the notion "That the magnitude of space is independent of time," Einstein introduced Seeliger's cosmological term, "... a term which was not required by

the theory as such nor did it seem natural from a theoretical point of view."

Then, in the 1920s, the Russian mathematician Alexander Friedman pointed out that we could still have an infinite Universe, with an average density different from zero, and yet get rid of Seeliger's cosmological term if we allow that the magnitude of space might not be independent of time, that is, if we allow that space might expand.

This predicted expansion, which was confirmed observationally by Hubble and others, implied both an "origin" and a "creation" for the Universe, and gave rise to the Big Bang models. But how could the Universe come out of nothing? What drives the expansion? And why should the Universe expand at the escape velocity? And there was even some doubt that the Universe could be older than the stars.

In the 1940s Bondi, Gold and Hoyle, in England, pointed out that we could get rid of the "origin" problem if we allow that creation is continuous, that is, that hydrogen is created throughout the Universe at a rate to match the expansion.

That gave rise to the Steady State models, which hold to the perfect cosmological principle, that the Universe should look the same not only from any place but also at any time. But where does the "new hydrogen" come from? And from where do we get the 3K-microwave background radiation discovered by Penzias and Wilson, which the proponents of the Big Bang took as the clinching evidence for their model?

Although the Steady State models got rid of the "origin" problem, they did not get rid of the "creation" problem. But we can get rid of the "creation" problem as well as the "origin" problem by allowing that the particles might recycle from the border of the observable Universe imposed by the observed expansion. (Actually, it is the redshift itself that imposes the border, rather than our interpretation that the redshift is due to an expansion.)

Since the spectral lines of the radiation coming from very near that border appear gravely redshifted, it follows that, as seen by us, the particles giving rise to that radiation are of very low energy and very low mass. And that low mass has two very interesting consequences.

First: Since radiation going through a field of low mass particles will be thermalized to 3K by being so often picked up and reradiated, we have a possible alternative explanation for the observed microwave background radiation discovered by Penzias and Wilson, and interpreted by some as the "echo" of the Big Bang. Second: If the mass of the particles is low, their momentum, and therefore our necessary uncertainty in

that momentum, will also be low. But, by Heisenberg's uncertainty principle, if our uncertainty in the momentum approaches zero at that border, our uncertainty in the position of the particles there must approach totality. And that allows the particles to recycle from the border.

Now if the particles can recycle, by tunnelling, from the border of the observable Universe, we can get rid of the "creation" problem as well as the "origin" problem.

Is there any observational evidence that material is thus recycling from the border? There is. The Hubble Space Telescope supplied evidence that there are some nine or more clouds of hydrogen between the quasar 3C273 and ourselves. And it is difficult to believe that such clouds could have survived for some fifteen thousand million years without condensing into something we could see. Measurements with the Hubble Space, Telescope also indicate that there is more than enough hydrogen in the great inter galactic voids to make all the known galaxies. And finally, the slowing down of the expansion rate predicted by the Big Bang has not been confirmed.

## *WAS Ad*

The following two telescopes are for sale from Donna who is the widow of the late Peter Bushby who was for very many years a member of this society. Peter was by profession an optical maker and technician and built/restored the two telescopes amongst many others over very many years so the quality is, I am sure excellent. I purchased a 6" Newtonian from him in 1965.

5½" Newtonian F 5.5 The two mirrors are in good order. The eyepiece fitting is 1"1/4 diameter. It has a brass finder without cross wires. The tube is a wooden box. It is mounted alt/azimuth and there is no tripod as it fitted Peter's permanent pier in his back garden.

4¾ Refractor F13 equatorially mounted with large wooden tripod. The eyepiece fitting is 0.96" but this, I think, can be adapted to take 1"1/4 push fit and RAS screw eyepieces. I have seen both these telescopes and this one too has a large finder except this one has crosswires. A refractor of this size offers a rare opportunity.

In addition to the above two telescopes there are very many eyepieces of different types to choose from.

As far as prices are concerned, all I can really say is 'offers please'

Any one interested should contact me on 01903 505346

Graham Boots

## ***What's on the Box***

*Saturday 16th November 2002*



### **12.45 – 13.05 ~ The Sky at Night**

(Radio Revolution) In the second of this two-part special from Jodrell Bank, Patrick Moore explores the future of radio astronomy, looking at how the upgrading of the Lovell telescope and MERLIN array are giving radio astronomers the chance to unlock more secrets of the universe

*Thursday 21st November 2002*



### **20.00 – 22.45 ~ Contact**

Sci-fi epic about a space scientist who receives a message from a distant point in the universe, which proves the existence of intelligent extraterrestrial life. Encoded in the mass of data she receives from space is a blueprint for a spacecraft. Despite protests from religious leaders, the ship is built and she is launched into deep space without any knowledge of the aliens' intentions

## ***WAS News News***

### **Etna eruption viewed from space**

Dr David Whitehouse ~ **BBC News Online science editor**

Astronauts on board the International Space Station have taken two spectacular images of erupting Mt Etna in Sicily.



*The image captured by the Expedition Five crew on the International Space Station is looking to the southeast. It was taken on 30 October, 2002, at about 1130 GMT.*

The crew were able to observe Etna's recent activity, and photograph the details of the eruption plume, as well as smoke from fires triggered by the lava as it flowed down the 3,350-metre-high (11,000 feet) mountain.



*Dust plume is blown towards Africa*

Both of these images are looking obliquely to the southeast over the island of Sicily.

The wide view shows the ash plume curving out towards the horizon, caught first by low-level winds blowing to the southeast, and to the south towards Africa at higher altitudes.

The lighter-coloured plumes down slope and north of the summit, seen in the close-up view at the top of the page, are produced by forest fires ignited by lava flowing into the pine trees on the slopes of the mountain.

Etna is currently undergoing one of its most vigorous eruptions in years.

It was triggered by a series of earthquakes on 27 October. The astronaut images were taken three days later on 30 October at about 1130 GMT from an altitude of 400 km (250 miles).



*Picture from NASA's Terra satellite October 28*

## *Diary*

**November 2-16** Exhibition at Worthing Central Library from Saturday 2nd November to Saturday 16th November 2002 Member's contributions welcome.

**November 13** *Getting Started with CCD Astronomy* - Alan Smith (Christ's Hospital Observatory and Horsham Astronomical Group)

**December 11** *North American Star Parties* - Owen Brazell editor of "The Deep-Sky Observer" published by the Webb Society.

**January 8** *Society New Year Social*

**February 12** *Astronomical Imaging from La Palma* - Nik Szymanek & Ian King

**March 12** *Indoor Astronomy (observatory-remote operating)* - Dr. Lilian Hobbs of Southampton AS

**April 9** TBA

**May 14** TBA

**June 11** *The Planet Mars* - Jerry Workman Bsc., F.R.A.S.

All Meetings (**bold**) are held on the second Wednesday of every month unless otherwise stated, at Heene Church Rooms, Worthing at 7.30 p.m. Meetings include the latest astronomical work, reports and, photographs by members. For further information please call 01903 521205, on the Internet at [www.was.org.uk](http://www.was.org.uk) or

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## *Note to Contributors*

Contributions & Correspondence for the **December** issue of WAS NEWS should be with the Editor by **December 1st**. All material for inclusion should be sent to the Editor.

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