

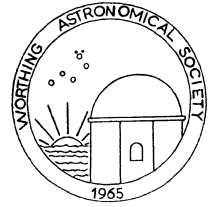


# WAS NEWS

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 156

September 2002

## ALMANAC

All times U.T.

For B.S.T. add one hour

September./October.

### LUNAR

September	Date	Time	rise	set
First Quarter	13th	18.08	13.56	21.36
Full Moon	21st	13.59	18.30	05.10
Last Quarter	29th	17.03	21.36	14.18
<b>October</b>				
New moon	6th	11.18	05.42	17.52
First Quarter	13th	05.33	14.47	22.16
Full Moon	21st	07.20	17.17	06.25

2nd	09
5th	04
6th	19
8th	15
10th	19
11th	13
13th	07
20th	14

October
Jupiter 4° S. of moon
Mars 4° S. of moon
Mercury at stationary point
Venus 9° S. of moon
Venus at stationary point
Saturn at stationary point
Mercury at greatest elongation W. 18°
Neptune at stationary point

### EARTH

September	Sunrise	Sunset
13th	05.32	18.20
21st	05.44	18.02
29th	05.57	17.43
<b>October</b>		
6th	06.09	17.27
13th	06.20	17.12
21st	06.34	16.55

Minima of Algol			
September	14th 04.18	17th 01.06	19th 21.54
	22nd 18.42		
October	7th 02.54	9th 23.36	12th 20.24

### PLANETS

(as at September 29th.)

Constellation	Rises	Sets	Mag.
<u>Mercury</u> Virgo	05.49	17.24	+4.3
Too close to the Sun for observation			
<u>Venus</u> Libra	09.58	18.11	-4.6
Unsuitably placed			
<u>Mars</u> Leo	04.24	17.21	+1.8
Morning object becoming visible in the East			
<u>Jupiter</u> Cancer	00.54	16.03	-2.0
Morning object visible in the East			
<u>Saturn</u> Orion	21.19	13.29	+0.1
Morning object visible in the East			
<u>Uranus</u> Capricornus	16.27	02.17	+5.7
Just passed opposition			
<u>Neptune</u> Capricornus	15.42	00.44	+7.9
Just passed opposition			
<u>Pluto</u> Ophiuchus	11.32	21.25	+13.9
Have you seen it yet.!!			

### PHENOMENA

Day	Hour	September
10th	07	Venus 7° S. of moon
14th	20	Mercury at stationary point
26th	11	Venus at greatest brilliancy
27th	19	Mercury in inferior conjunction
29th	03	Saturn 3° S. of moon

Lunar Occultations				
Times as at W.A.S. Observatory				
Date	U.T.	S.A.O.No	Mag	Phase
<b>Sept</b>	<b>h. m. s.</b>			
13th	19.09.23	185320	3.3	diss
13th	19.56.07	185346	7.3	diss
14th	19.20.33	186687	6.6	diss
14th	20.20.38	186726	7.9	diss
14th	20.38.01	186752	8.1	diss
27th	22.25.41	76797	8.9	reapp
27th	22.27.56	76807	9.0	reapp
27th	22.28.57	76800	9.3	reapp
27th	22.44.59	76806	8.7	reapp
27th	23.30.49	76830	8.4	reapp
27th	23.54.01	76842	8.9	reapp
<b>Oct.</b>				
11th	18.08.48	186092	8.4	diss
11th	18.56.42	186140	8.8	diss
11th	18.56.58	186147	9.0	diss
12th	15.19.20	187448	2.1	diss
12th	16.05.40	187448	2.1	reapp
18th	18.35.18	147042	4.6	diss
18th	21.04.54	128572	4.6	diss
18th	23.37.49	128599	8.9	diss

This is only about 12% of the predictions for the W.A.S. observatory.

Dave Wells

## *Editors Note*

Greetings all, welcome back to WAS News, which after a summer recess has returned super charged with articles, reports and information Enjoy this months bumper issue.

Rob

### From The Chairman

Brian Halls

The summer is now coming to its conclusion and we are already noticing that the evenings are starting to draw in.

Despite the unsteady weather at the start of the summer, the latter part of the season blessed us with (more or less) fine weather.

It was a busy time. On the 20<sup>th</sup> July we had the annual Society BBQ, held at the Observatory – many thanks to Graham and Eileen opening the home (well, garden at least) to members and guests and, many thanks to Avril Swann for organising the food – thanks also to our treasurer Mike Marshall for actually toiling over the BBQ. There were no clouds to interfere with views of Venus and appropriately as the evenings was the 33<sup>rd</sup> anniversary of the first moon landing, we all got to have a good look at a waxing gibbous moon.

The Perseid meteors gave us a good display too – clear and fine weather conditions coupled with no moon gave some 15 members at Ferring Beach an observing treat. A fellow member of the Committee remarked to me how bright the Milky Way is from this location – during the summer the condensation of stars in Sagittarius close to the centre of our galaxy can be seen over the watery horizon.

Even the Sun put on a show – a number of naked-eye sunspot groups had been observed over the summer months, many were extremely dynamic and were responsible for aurora displays.

There are of course comets for us to observe - **Comet Hoenig** is travelling through the constellations Ursa Major and Canes Venatici during September. It has a diffuse coma and is shining at a brighter-than-expected magnitude 7.5. Meanwhile comet **Comet SWAN** is poorly placed at the moment in the pre-dawn sky.

This is also the time of year when we have to think about the coming Society year ahead.

Firstly, our Society AGM is due next month. This is an important meeting – the Society accounts will be

presented, while the Chairman, Acting Secretary, Treasurer and, Curator of the Observatory will also present their annual reports.

Society officers are also elected at the meeting. The position of **Chairman, Deputy Chairman, Secretary, Assistant Secretary, Treasurer, Curator of the Observatory**, all have to be elected at this meeting. During this year we have not had a Secretary – the work of the Secretary is presently being shared between existing members of the Committee. If you are interested in standing for *any* position on the Committee, please do not hesitate to contact me for further details and, if you feel you would like to have a go at one of these jobs, help from other members of the committee is always on hand.

Section Directors, Editor of WASNews and, Librarian are also elected at the AGM – again, if you are interested in having a go at one of these jobs please let me know.

**Remember, nominations for election at the AGM must be with the Acting Secretary 7 days after the September 11<sup>th</sup> meeting as per article 6.3 of the constitution. Address on the last page of WASNews.**

Summer is traditionally known as the ‘silly season’ where news items are concerned and this year appears to be no different. News that a planet, known only as Planet X is careering into our solar system and which will bring about catastrophe of biblical proportions to Earth in 2003 was one such item. Naturally you have to buy a nice expensive book to find out more about Planet X and the Zetans who warned certain authors about it!

One other news item which I thought was a piece of ‘silly season’ but which turns out to be true is the idea that the Moon should become a dumping ground for nuclear waste – I am sure you will agree this is a disgraceful idea and one which, hopefully, will be quickly forgotten. The upside of dumping nuclear waste on the Moon is of course that it will devalue all the Moon acreage that people have purchased from unscrupulous lunar real estate companies, who have no right to sell off bits of the Moon at all!!

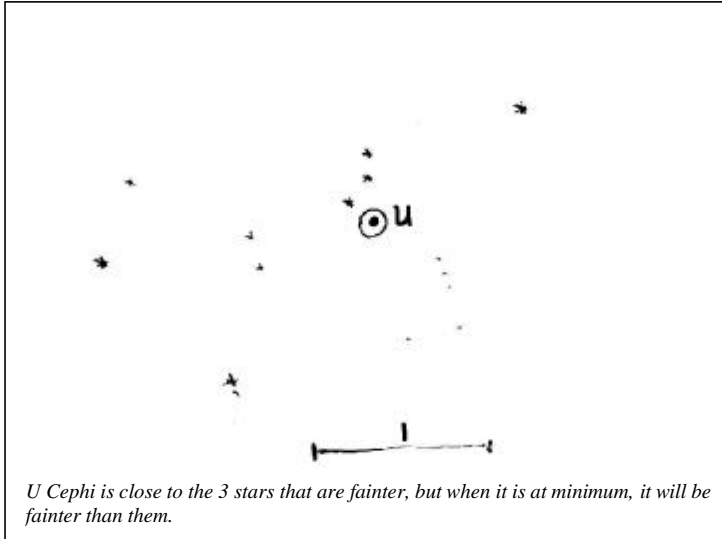
On a more serious note, this is also the time to look forward to astronomical events – eclipses, solar transits, regular meteor showers and major planetary oppositions are all due this coming year (2002-03) and there is always the possibility of a bright comet appearing here or there. Details will appear in WASNews and will be announced at meetings as and when. We have, I am sure, an interesting and exciting society year ahead of us.

## ***Dates for your Diary***

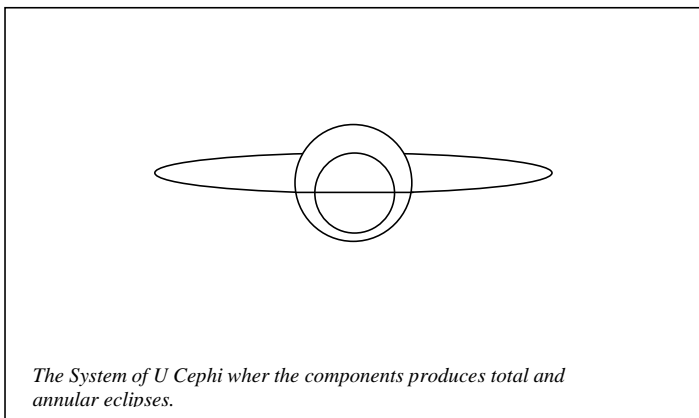
### **U Cephei**

Alex Vincent

This fine eclipsing binary star has a period of 2.493 days and is visible all year round, being only  $8\frac{1}{2}$  degrees from the North Pole. It has a large amplitude of 2.4 magnitudes where it is 6.8 at maximum and drops to 9.2 at minimum. The star's position is RA 01h 02m 18s and declination is  $+18^{\circ} 53' 00''$  Epoch 2000



The duration of the eclipses are 9.6 hours (taking some 4 hours to fade and rise) and two hours of which is total. During the total phase, the star remains at magnitude 9.2. At the secondary minimum when the bright star passes in front of the fainter, the eclipse is annular, but the drop in magnitude is only about 0.1 and occurs midway between primary minima. Below is a list of dates and times (UT) of primary minima of U Cephei for September / October 2002. Make observations and estimates once every 15 minutes.



Sep 11 22.17, Sep 16 21.57, Sep 21 21.37, Sep 26 21.17  
Oct 1 20.57, Oct 6 20.37, Oct 11 20.17, Oct 16 19.57  
Oct 21 19.37 and Oct 26 19.17

Note that minima of this eclipsing binary occur 20 minutes earlier every 5 days and so it is easy from the above times to predict next minima to the nearest minimum. Also the start of the eclipse on the above dates occurs in daylight and so one might wish to watch a rise back from maximum to minimum. Some may wish to take a look at the star at maximum and again at minimum just to see the difference in magnitude instead of making estimates every so often.

### **John Dobson Lecture**

Nick Quin

John Dobson, founder of the San Francisco Sidewalk Astronomers ([www.sfsidewalkastronomers.org](http://www.sfsidewalkastronomers.org)), is known the World over for his innovative telescope design that now bears his name. He is visiting the UK and Ireland during September and October.

On Wednesday 2nd October 2002 at 20.00hrs, he will be speaking in The Assembly Rooms, North Street, Chichester. Tickets, £5 from Nick Quinn, 15 Newham Lane, Steyning, West Sussex, BN44 3LR, Telephone: 01903 814090. Please make cheques payable to "Worthing Astronomical Society" and enclose an SAE

### **Annular Solar Eclipse**

Alex Vincent.

On May 31 2003 there will be an annular eclipse of the sun visible in Scotland. I have booked a trip by plane to a place called Wick in north-eastern Scotland with Travel Choice travel agents in Montague Street and the cost of flight only being £205.60. I am travelling on Friday May 30 from Gatwick to Wick and returning on Monday June 2nd. Is anyone else in the society interested in coming with me to view the eclipse?

The sun rises in Wick about 26 minutes before annularity and should be a spectacular sight with the sun being a red ring, an effect called a ring of fire eclipse. The last annular eclipse in Britain was in 1921 and the next one after 2003 will be in 2093

## ***Reports***

### **Section Report - September 2002**

Glen Thomas

With the Sun setting more than two minutes earlier each evening it is no longer necessary to lose sleep to get out and see the splendour of the night sky. Although all the terrestrial planets are too close to the Sun in the sky to see easily, the cold outer solar system planets seem fitting targets as the autumn chill forces warmer clothing. Mercury will not make its next appearance until October mornings.

Venus might just be visible very low in the SW as a thin crescent immediately after sunset early in the month, as it approaches solar conjunction.

Mars is past last month's conjunction, but is not yet suitably placed for observation.

Jupiter is moving away from the Beehive (Messier 44), in Cancer, that it passed earlier in the month, but does not rise before midnight until the middle of October.

Saturn has moved out of Gemini and is now in the non-zodiacal constellation of Orion for 10 weeks: astrologers can explain the significance of that! Saturn rises before 11pm (around 9pm by end of month, BST), but does not reach an altitude of 30° until the small hours, so any late evening observations will be made through a great thickness of atmosphere which limits the detail visible.

Uranus and Neptune are still well placed in Capricorn, if rather low. Binoculars are needed to see them, although Uranus, at magnitude 5.7, might be visible with the naked eye in dark skies.

Pluto is past its best now, low in the sky during the evening and setting before midnight.

Asteroid 15 Eunomia is passing through the constellation of Pegasus. It moves from 1° S of Markab (Alpha Peg, the SW corner of the Square of Pegasus) on Sep 07 to 1/2° N of Homam (Zeta Peg) a month later. At magnitude 8.1 it could be difficult to pick out amongst the background stars, but on Sep 28 it passes about 5' N of magnitude 4.2 Xi Peg.

With no other stars nearby the asteroid should be easy to identify. Try observing the day before or after to see the motion - about 1/5° per day - or perhaps 9pm and 12 midnight.

## **Member's Perseid Meteor Watch**

Graham Boots

On Monday evening the 12<sup>th</sup> August around 20 members and friends gathered at our Ferring Beach observing site to watch the display of Perseids meteors which was predicted to peak at 10.00 p.m. The four day old moon was low in the western sky and set at 10.30 p.m. leaving a very clear dark night sky and the Milky Way clearly visible arcing across our zenith. The evening was calm and warm. Mid way through the evening I estimated the limiting magnitude at 5.

We recorded meteor activity for a 2 hour period from 21h 17m to 23h 18m UT. Our results that will be sent to Neil Bone, British Astronomical Association meteor section director, totalled 114. These were made up of 95 Perseids, 11 alpha Cygnids, 4 alpha Capricornids and 4 sporadics. At this time of year there are in fact a total of 7 known active meteor radiants.

The theoretical expected number of Perseids was put at 80 in the 2002 Handbook of the British Astronomical Association. This applies as if the radiant were in the zenith but at this time of night the radiant was low in the north east, perhaps around 30 degrees in altitude.

We recorded 48 Perseids in the first hour and 47 in the second so I expect that the adjusted and final zenith hourly rate (ZHR) will be found much in excess of the predicted 80.

Alex Vincent and I carried out some photography. I do not think I captured any but Alex had a -5 Perseid go through his 50 mm field of view at 21h 56m when his camera was centred on the constellation of Cygnus. This meteor gave rise to a double vapour trail that lasted just a second and was seen by many. If Alex was successful he will show his slide at a future monthly meeting of the society.

This was a very pleasant and successful event and I thank all those present who helped in collecting the data. The Perseid maximum activity for August 2003 coincides with a full moon so the event will not be so good.

Any one who has made a record of activity or who has something to report in connection with what they saw I would be very pleased to receive it as soon as possible so I can include it with our submission to the BAA

## WAS Bar-B-Que Result

Graham Boots

Fine weather and a warm clear sky greeted 39 members and friends, including 5 children on Saturday the 20th July for the society's Bar-B-Que held at the Observatory.

A big thank you to Avril Swan and Wendy Dunkerley for preparing the food and Michael Marshall and Norman Gray for endlessly cooking all the hot food throughout the evening. Also a big thank you to those many people who prepared and cooked food before the event.

The Observatory was open and amongst the objects viewed by around 25 people were Venus showing a gibbous phase, a 10-day-old Moon, M13 the globular star cluster in Hercules, M57 the ring nebula in Lyra and the coloured double star Albireo in Cygnus. Various filters were employed. A minus 7 Iridium satellite was also seen during the evening.

This was one of the biggest and most successful event of this type we have ever held and was due to the efforts of very many people and the excellent weather of the day.

## Solar Section Report - July 2002

By Section Director, Brian Halls

Sunspot region 10008 which had been quite prominent in June disappeared over the western solar limb on the last day of the month. (See last issue)

A writer at *Sky & Telescope* wrote in late July concerning the quality and number of sunspots; that sunspot maximum was in May 2000 but no one it appears had bothered mentioning it to the Sun. At the beginning of the month sunspot activity looked as if it was going to quieten down – on the 3<sup>rd</sup> there were just 5 groups visible, all but one in the southern solar hemisphere.

Thankfully for observers this was only a slight lapse as sunspot numbers began to increase in quantity and quality one again. By the end of the first week two large groups in the south had sprung up but rapidly decayed or rotated out of view.

Notably on the 8<sup>th</sup>, 8 sunspot groups were visible and all were in the southern solar hemisphere – this situation remained for 2 days when a sizable group appeared at the eastern solar limb. Solar activity throughout the month was centred very much in the southern half of the Sun.

By mid-month activity began to peter out once more though the northern group that broke the southern monopoly on the 10<sup>th</sup> (region 10030 N19<sup>0</sup> L=015<sup>0</sup> size=690 type=Fki) grew to become a very complex sunspot group. (See picture). By the 17<sup>th</sup> its size had grown to 1350 millionths of the solar hemisphere (msh) – quite a sizable naked eye object through thick cloud at sunset or (preferably) through **grade-14 welders glass**. It was responsible for a number of major x-ray flares, which triggered sizable coronal mass ejections (CME).

By the 19<sup>th</sup> only 4 groups were visible on the Sun but two of them were clearly naked eye. The northern group had been joined by region 10036 at S07<sup>0</sup> L=296<sup>0</sup> and which also was a highly active sunspot group. (See picture). By the 17<sup>th</sup> 10036 had also grown in size considerably – 1070 msh. Following closely to 10036 was another group (10039) at S16<sup>0</sup> L=206<sup>0</sup> (size=850 type=Fkc) which rotated into view on the 22<sup>nd</sup>. This very active area had announced its presence a day earlier with a powerful x-ray outburst.

By the end of the month this region was beginning to approach the west solar limb but was still a very active group.

At about the same time sunspot activity elsewhere on the solar disk began to perk up as well. It was a very busy time doing disk drawings and measuring the position of the groups as well as counting the sunspot active area and numbers!

MDF = 5.38 (N= 2.41; S= 3.00) R = 92.47

### August Solar Report

Sunspot region 10039 was still visible on the solar disk at the start of the month but was rapidly approaching the western solar limb. Also visible were regions 10044 (S21<sup>0</sup> L=209<sup>0</sup> area=620 type=Fkc) and 10050 (S08<sup>0</sup> L=192<sup>0</sup> area=730 type=Ekc). The large groups had disappeared by the end of the first week of the month, leaving only smaller groups visible.

These smaller groups were nothing unusual – the type of spots normally associated with the Sun at this point in the supposedly decreasing sunspot cycle.

For a few days solar activity settled down. On the 13<sup>th</sup> a large group rotated into view – designated region 10069 (S07<sup>0</sup> L=298<sup>0</sup> area=1210 type=Ekc) this region was very unsettled and described in bulletins as being extremely magnetically complex. This large naked eye group dominated the solar disk for several days – its complex magnetic structure was almost certainly responsible for

the flare that created an aurora warning mid-month. This group because of its shear size did not require a telescope to observe – it was clearly visible on the setting Sun on the evening of 17<sup>th</sup>.

Though there were many sunspot groups visible during this period, region 10069 dominated sunspot activity for the remainder of its journey across the visible face of the Sun. By the time it disappeared over the western limb on the 25<sup>th</sup> it was still quite a sizeable active area.

I am writing this at the end of August but, if region 10069 is still an active group while it is out of view of Earth we should be watching the Sun the weekend of 7-8<sup>th</sup> September for a possible reappearance of this group.

Solar activity quietened down a little for the latter part of the month – sunspot activity was confined very much to the southern solar hemisphere.

An alert was released concerning activity from an out of view sunspot group on the 28<sup>th</sup> – this group rotated around the east limb on the 29<sup>th</sup> – I observed it early on the morning of the 29<sup>th</sup> when it was *just* visible. It was also a day when the Sun was very much covered in large amounts of clouds of faculae. As the last two days of the month gave way, this sunspot group appeared as region 10095 (N07<sup>0</sup> L=059<sup>0</sup> size=0450 type=Fki on 31<sup>st</sup>)

Any and all observations of this group made by members during September would be gratefully accepted.

Members observed the Sun on 27 days during July and 27 days in August: Reports were received from Graham Boots and, the Director.

MDF=

I would like to thank Belgium solar observer Franky Dubois for allowing WASNews to reproduce some of his solar photographs in this report. For more of his work please check out his website at: [www.digilife.be/club/Franky.Dubois/](http://www.digilife.be/club/Franky.Dubois/)

## **July Meeting Reviewed**

Report by David Chilard

This month's Meeting featured contributions given by various members of the Society.

**Society announcements:** Brian Halls announced that Torbay Astronomical Society had arranged a weekend of astronomy-related events called Astrowest 2000, beginning on the 17<sup>th</sup> of August, at Torquay Boys'

Grammar School. More details are available through flyers.

Furthermore, Brian encouraged members to e-mail the BBC to persuade them to recommission the Open University programme *Final Frontier*, as this was the only regular astronomy-related show aside from *The Sky at Night*.

**“Moon Worship at Black Patch”:** Alex Vincent reported on the practice of an ancient tribe at Black Patch, involving crescent marks made in the land and funereal furniture. This may be worship, but there is a growing body of thought that it was in fact a form of eclipse-predicting, in conjunction with a possible stone temple on nearby Harrow Hill.

**Observatory report:** Graham reported that there had only been two successful viewing nights owing to bad weather, though there had also been a photography session; a further solar photography session is planned. The astronomical imaging system at the Observatory is almost complete.

Graham also announced that the SAGAS meeting would take place on Saturday in Portsmouth, and that the Society's annual BBQ would be taking place at his house on Saturday the 20<sup>th</sup>, details available. Moreover, the Society's flyer was also now available.

**“Cardboard in Astronomy”:** Graham gave in-depth coverage of the many usages for cardboard in astronomy, complete with demonstration aids. He has used cardboard to reduce the width of a telescope's aperture in order to reduce uneven illumination, protect a telescope from dew, remove camera / telescope shaking from internal shutter and flip up mirror actions, and enhance stars' secondaries by creating visual “spokes”. Cardboard is particularly useful because it is readily available and easy to work with, and often obviates the need to buy expensive equipment to do a simple thing.

**“Planetary Formation”:** Bob Turner spoke of the current theory of planetary formation, involving an accretionary disc of unused material surrounding a newly formed star. Although this adequately explains the formation of rocky planets such as Earth, the timescale is wrong for gas giants such as Jupiter in our Solar System. This is because planets are believed to form after the star enters its T-Tauri phase, where gaseous material is pulled into a star as it begins nuclear fusion. Hence, the gas giants could not form within a certain distance from the star (17 Astronomical Units for our Sun), while rocky planets may form from larger particles of dust during or after this stage.

After the break, David Storey relayed an article from *Electronics Weekly*, reporting that the first transmission of television signals via satellite on the 11<sup>th</sup> of July, 1962 was to be re-enacted on the 11<sup>th</sup> of this month. Moreover, the famous Oscar-7 satellite, beloved by radio hams, has inexplicably begun working again, despite having broken down decades previously!

**“Comet catching”:** Brian Halls reported on the comet-chasing space probe, CONTOUR (Comet Nucleus Tour), which has been launched and will soon move into its specified elliptical orbit. It will pass comet Encke in August next year, Sch(?) in June 2006 and Dunest in 2008, as well as surveying any other comets that are encountered.

**Photography:** Nick Quinn demonstrated numerous photographic techniques, involving both slide film and images recorded on computer, including an ominous Earth-grazing asteroid!

**“Light in Astronomy”:** Bob revealed that we only see a narrow band of the electromagnetic spectrum with our eyes. Light is interpreted by the rods and cones in our eyes – the former dealing with intensity and the latter with colour. The cones become inactive in darkness, hence we tend to see in monochrome at night and thus star colours are less easy to perceive than would be expected.

*The Meeting was well turned-out and well received by all present.*

## Articles

### Virtual Moon Atlas

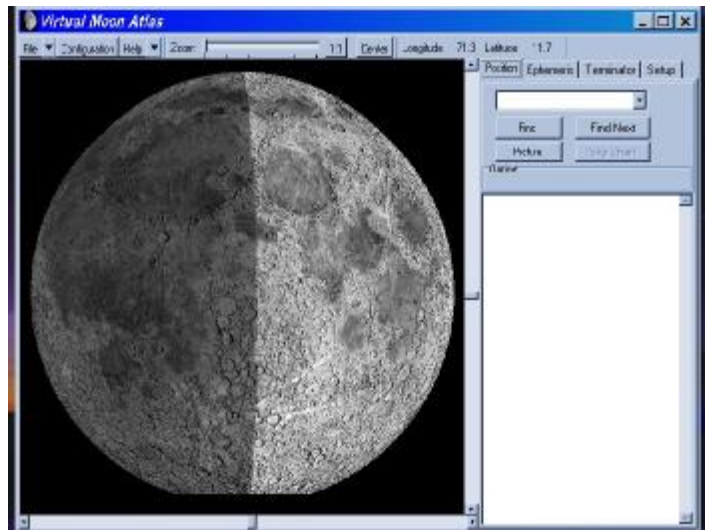
Brian Halls

One of the advantages of the Internet is that it is a marvellous resource for anyone interested in astronomy.

One such good website is [www.astrosurf.com](http://www.astrosurf.com). Here any lunar astronomer can, at the click of the mouse download a program called **Virtual Moon Atlas**.

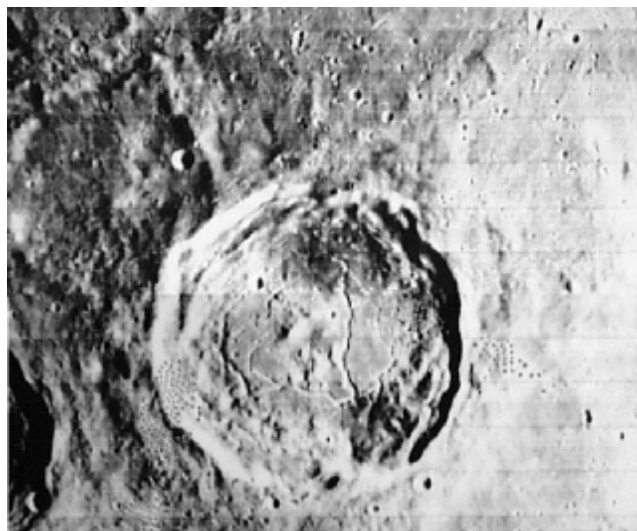
The program in zip format is about 3.5Mb big and took less than 10 minutes to download using a modem – a broadband connection would be far quicker of course, but I did not find the download time too arduous.

Once downloaded and unzipped, the program is opened and brings up a picture of the Moon as would appear in real time – libration and phase included.



To the right of the map is a column which can controls certain features; the **Position** button allows the typing in of a lunar name as described earlier. Next to that is **Ephemeris**, which gives the RA and Dec of the Moon, its age since the last new moon, percentage illuminated and, libration angle. A button marked **Picture** allows access to Lunar Orbiter Photographic Atlas of the Moon (LOPAM) – a wide selection of Orbiter pictures (more of which below).

Say you want to find the lunar feature Atlas – type in Atlas in the search box and the position of Atlas is highlighted. The operator can use the zoom feature to take a closer look at the crater. In the large vertical window under these controls all the details of the object appear. From this we find that Atlas is named after a mythological character. The name Atlas was given to this feature by Riccioli, but other astronomers may have named it differently and these names are also given. Physical information regarding the crater and other details are given here as well.



If clicking the **Picture** button and if the additional LOPAM programs have been downloaded (each file being in the region of 1.5 to 2.5 Mb) an Orbiter picture of Atlas will also appear.

The next button is named **Terminator** and clicking on this advises the names of features on the terminator at the present time. The size of telescope being used can be typed into a box and the features visible with that size instrument will appear – certainly useful to determine the smallest lunar feature visible in your own telescope. The objects can be sorted by their lunar position or, their interest to observe or, again by telescope size.

The last button **Setup** allows the operator to adjust the image – darkness of terminator, the amount of darkness of the unilluminated portion etc.

Further downloads from the website store photographs taken from the Lunar Orbiter probes help build the program up.

Once the main core program has been downloaded use of the Virtual Moon Atlas can be done off line.

Created by two French astronomers, Christian Legrand and Patrick Chevalley, it has a help section, which downloads with the core program and so can be accessed when the program is open.

There are a few things that I found disappointing – the lunar image is the naked eye view of the Moon (for northern hemisphere observers at least), there is no facility to invert the lunar image as it would appear in an astronomical telescope and there is no way the image can be printed out unless it is screen grabbed (as it appears here is WASNews) and then put through photo editing software.

But both of those gripes are small and should not detract from this program, which a lot of hard work has gone into. Plus of course it is free to download and use.

I recommend it.

### **Virtual Particles**

Michael A Marshall

Virtual particles supposedly contribute to the evaporation of black holes. The reasoning presupposes that empty space, on the sub-atomic scale, is not empty at all: short-lived particle/anti-particle pairs flicker in and out of existence in very much too short a time to traverse an atom. These pairs normally annihilate each another and so

return to space the energy they borrowed for their short existence.

On the edge of a black holes horizon, however, the prevailing tidal gravity can pull the pair right apart, expending energy in the process. One member of the pair would be swallowed by the black hole, and the other would be liberated as a real particle as if it had come from the black hole to carry away the expended energy. The smaller the hole, the greater the tidal gravity, and the greater the rate of apparent evaporation.

The question arises as to where these virtual (i.e. effective but not actual) particles come from. Clearly the implication is that all real particles are immersed in a sea of countless virtual particles: virtual particles do not live their real selves in our three-dimensional world. By way of understanding a possible answer, and surely one is needed, let us consider a near parallel case in real life, the London Underground Tube system.

Essentially, the world of the tube system is one-dimensional. Motion is essentially either forward or backward; vehicular dimensions are significant in length only. This one-dimensional world would be more convincing if we were to assume that travellers cannot see sideways, above nor below, nor pass one another; but we would allow them an ability to communicate with one another, and to possess an insignificant cross-sectional area (to our understanding alone) in order for them to possess substance.

A horizon to these travellers is a vanishing point, and to us it is a curvature into a second dimension, a turn to another district may be. A train coming the other way in another tube would to them be considered as a hypothetical parallel world. If that train crossed their world at a crossing in what would be their hypothetical two-dimensional world, they would be unaware of it but they would consider it a virtual train, not belonging to their one-dimensional world. The train would flash into and out of existence in an unidentifiable form. Should they have the misfortune to be at the crossing at the time, there would be a sudden parting and damage to the train, a part of it vanishing from existence and possibly replaced by another part that is not a match,

Is this analogy not an indication that virtual particles in our familiar set of three dimensions could be considered real particles in another set of dimensions in which we do not live, a sub-set considering the sub-atomic scale under discussion? This is in contrast to a super-set of dimensions that would enclose our familiar set of three, as discussed in my previous article.

The foregoing explanation might answer another question. The atom used to be explained as a miniature solar system with its own set of rules. An electron existed

## WAS News News

### Hubble's eye in the sky

Dr David Whitehouse - BBC News Online science editor

Hubble's latest picture in its series of images of dying stars is one of its most remarkable.

Like many other so-called planetary nebulae, IC 4406 exhibits a marked degree of symmetry; the left and right halves of the Hubble image are very nearly mirror images of each other.



*Gas Flees from a dying Star*

Astronomers say that if they could fly around IC4406 in a starship, they would see that the gas and dust form a vast donut of material streaming outward from the dying star. They have dubbed it "the retina" after the similarity of the dust lanes to blood vessels in the eye.

#### Hot, glowing gas



The Ring Nebula

The gas cloud confines the intense radiation coming from the hot remnant of the dying star.

Gas on the inside of the donut is ionized by light from the central star - light from oxygen atoms is coloured blue in the Hubble image; hydrogen is shown as green; and nitrogen as red.

in one of a number of allowable orbits, never in between at any time. Each orbit had a discrete energy level, and so between any two orbits there existed a particular energy difference. If that energy difference were supplied by a photon from without, then the electron receiving it would jump from the orbit of lower energy to the orbit of higher energy. The question arises as to how did the electron jump from one orbit to another without passing through the disallowable space in between. That was never explained. However, the answer appears not far away.

The electron, on receiving the requisite photon energy, pairs off with a virtual anti-electron of matching energy and so pops out of existence with it. In order to maintain an energy balance, an electron in the sub—set of dimensions is empowered to pop out as a real electron in the higher electron orbit. Just as an electron enters a wire to convey electric current, and another electron comes out at the other end, there being a long queue of mobile electrons in between, so may it be that the electron that allegedly jumps an atomic orbit is not just the same electron with added energy, but another electron altogether.

There is yet another question that might be answered. It used to be held that light is a wave motion regulated by the ether, an invisible carrier having a proper motion. This other question is whether the sea of virtual particles carry the light, whether the photons that reach us from another star are the same photons that set out in the first place, or are the result of numerous real-virtual photon exchanges representing the original. If virtual particles do carry the light, they might be expected to gear their exchanges to the real world of the observer and so propagate light at one speed in relation to the observer.

Whilst these questions do not affect practical astronomy, as we know it, surely it is sometimes part of an astronomer's job to find answers and so improve understanding and widen the research. Any reader's comment on virtual particles would be much appreciated.

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

Monday 16<sup>th</sup> September 2002



01:00 to 01:20 ~ The Sky at Night

(The Long Wave) The world of astronomy. Patrick Moore recalls the important discoveries made at Jodrell Bank as Britain's foremost radio astronomy observatory prepares to celebrate its 45th anniversary

Unseen in the Hubble image is a larger zone of neutral gas that does not radiate visible light, but which can be seen by radio telescopes.

Researchers say that one of the most interesting features of IC 4406 is the irregular lattice of dark lanes that criss-cross the nebula. These lanes are about 160 astronomical units (AU) wide (1 AU is the distance between the Earth and Sun).

The dark lanes are located at the boundary between the hot glowing gas that produces visual light and the neutral gas seen with radio telescopes. We see the lanes in silhouette because they have a density of dust and gas much higher than the rest of the nebula.

The fate of these dense knots of material is unknown. If they survive the nebula's expansion they may condense into small dark objects or simply dissipate.

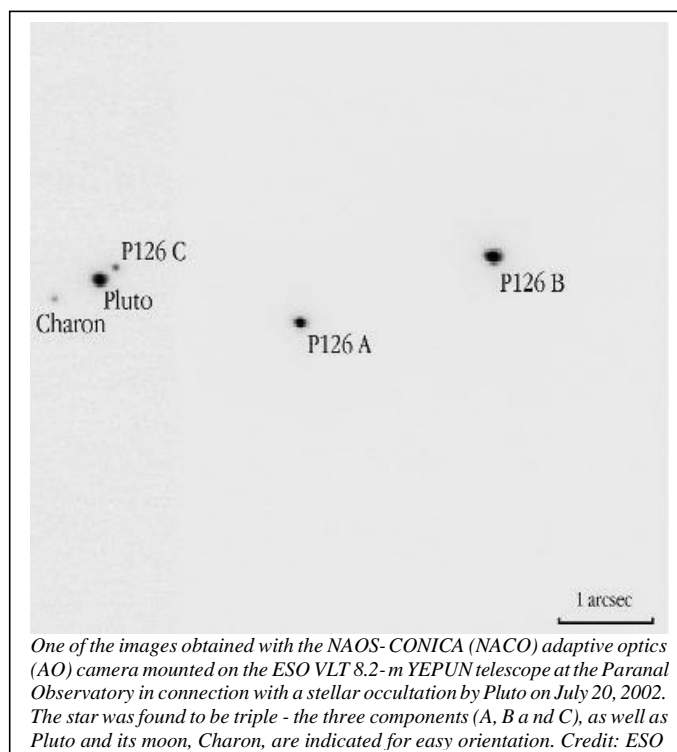
### **Pluto meets triple star**

European Southern Observatory News Release

A rare celestial phenomenon involving the distant planet Pluto has occurred twice within the past month. Seen from the Earth, this planet moved in front of two different stars on July 20 and August 21, respectively, providing observers at various observatories in South America and in the Pacific area with a long awaited and most welcome opportunity to learn more about tenuous atmosphere of that cold planet. On the first date, a series of very sharp images of a small sky field with Pluto and the star was obtained with the NAOS-CONICA (NACO) adaptive optics (AO) camera mounted on the ESO VLT 8.2-m YEPUN telescope at the Paranal Observatory.

With a diameter of about 2300 km, Pluto is about six times smaller than the Earth. Like our own planet, it possesses a relatively large moon, Charon, measuring 1200 km across and circling Pluto at a distance of about 19,600 km once every 6.4 days. In fact, because of the similarity of the two bodies, the Pluto-Charon system is often referred to as a double planet.

At the current distance of nearly 4,500 million km from the Earth, Pluto's disk subtends a very small angle in the sky, 0.107 arcsec. It is therefore very seldom that Pluto - during its orbital motion - passes exactly in front of a comparatively bright star. Such events are known as "occultations", and it is difficult to predict exactly when and where on the Earth's surface they are visible.



### **The July 20 occultation**

In order to profit from the rare opportunity to learn more about Pluto and its atmosphere, a large campaign involving more than twenty scientists and engineers from the Paris Observatory and associated institutions was organized to observe the July 20, 2002, event involving an occultation of a star of visual magnitude 11 (i.e., about 100 times fainter than what can be perceived with then unaided eye), referred to as "P126" in McDonald and Elliot's catalogue.

In May 2002, preparatory observations showed that star to be double, with the brighter component of the system ("P126 A") being likely to be occulted by Pluto, as seen from South America. However, because of the duplicity, the predictions of exactly where the shadow of Pluto would sweep the ground were uncertain by about 0.1 arcsec in the sky, corresponding to more than 2000 km on the ground.

### **The NACO images**

In the end, the close approach (an "appulse" in astronomical terminology) of Pluto and P126 A was indeed observed from various sites in South America, with several mobile telescopes and also including major facilities at the ESO La Silla and Paranal Observatories. In particular, unique and very sharp images were obtained with the NAOS-CONICA (NACO) adaptive optics (AO) camera mounted on the ESO VLT 8.2-m YEPUN telescope. These images were made during the final adjustments of the NACO instrument and in anticipation of the upcoming science verification observations.

## Diary

**September 11** *The Moon – a Biography* by Dr David Whitehouse (BBC On-line Science Editor)

**September 17-19** Earth Observation and Navigation Seminars, Earls Court 2, London – sponsored by the BNSC. Free admission to exhibition.

**September 21** BAA Annual Exhibition Meeting, Cavendish Laboratory, Cambridge.

**October 1** – Committee Meeting at the Observatory, 19.30.

**October 2** Talk by John Dobson (inventor of the Dobsonian telescope and founder of Sidewalk Astronomers) at Chichester – 20.00hrs

**October 9** *A.G.M.*

**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* by Alan Smith (Christ's Hospital Observatory and Horsham Astronomical Group)

**December 11** *TBA* by Owen Brazell editor of "The Deep-Sky Observer" published by the Webb Society.

**January 8** TBA

**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.

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