

# Janus



## Ewell Astronomical Society Newsletter – Spring 2008

Serving skywatchers in SW London and north Surrey

Ewell AS homepage [www.ewell-as.co.uk](http://www.ewell-as.co.uk)

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**JANUS-ON-LINE-IN-COLOUR:** For a full colour version of any recent Janus log-on to [www.ewell-as.co.uk/](http://www.ewell-as.co.uk/) Janus / Janus pdf file. Cut + paste web addresses [[URLs](#)] direct to your Internet Browser and save typing errors!

## EAS Meeting dates for your 2008 diary – see [www.ewell-as.co.uk](http://www.ewell-as.co.uk)

All held at Nonsuch HS for Girls – Ewell Road - Cheam [unless otherwise noted] and start at 8pm.

**Ordinary Monthly Meetings [in bold]** in Common Room start at 7.40pm.

Headley Heath meetings \*phone 01252 382940 from 7pm on evening to check observing is 'on'.

**Door subscriptions £1 and £3 for visitors** - Arriving at meetings with small change in your pocket and not tendering £10 and £20 notes is greatly appreciated.

\*Headley Heath meetings phone 01252 382940 from 7pm on evening to check observing is 'on'

Mon-Thu Apr 7-10 @ 8.30pm Observing Session Headley Heath\*

**Fri Apr 11** – Dr Darren Baskill [Leicester Uni] *X-ray Astronomy & Cataclysmic Variables*

Wed Apr 16 @ 8pm – Users Group Meeting – NSHS Observatory Deck

Mon-Thu May 5-8 @ 9pm Observing Session Headley Heath\*

**Fri May 9** – Prof. Malcolm MacCallum [QMC] *Gravitational Waves*

**Fri Jun 13** - Peter Meadows [BAA] *Solar Observing*

Wed Jun 18 @ 8pm – Users Group Meeting – NSHS Observatory Deck

**Fri Jul 11** – Prof. Mike Merrifield [Nottingham Uni] *How to build a Galaxy*

**August** – no main meeting

Wed Aug 20 @ 8pm – Users Group Meeting – NSHS Observatory Deck

**Fri Sept 12** – Prof. Monica Grady [OU] *The Earth - does it have a future?*

Mon-Thu Sep 22-25 @ 8pm Observing Session Headley Heath\*

**Fri Oct 10** – Dr Nigel Marshall -TBA

Wed Oct 15 @ 8pm – Users Group Meeting – NSHS Observatory Deck

Mon-Thu Oct 27-30 @ 8pm Observing Session Headley Heath\*

**Fri Nov 14** - TBA

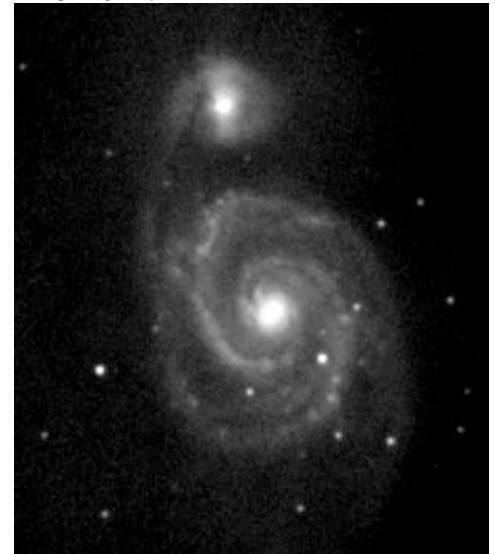
Mon-Thu Nov 24-27 @ 8pm Observing Session Headley Heath\*

**Fri Dec 12** – AGM + talks TBA

Mon-Thu Dec 16-19 @ 8pm Observing Session Headley Heath\*

Wed Dec 17 @ 8pm – Users Group Meeting – NSHS Observatory Deck

Whirlpool galaxy M51-30cm SCT @ WPO– M.Gavin

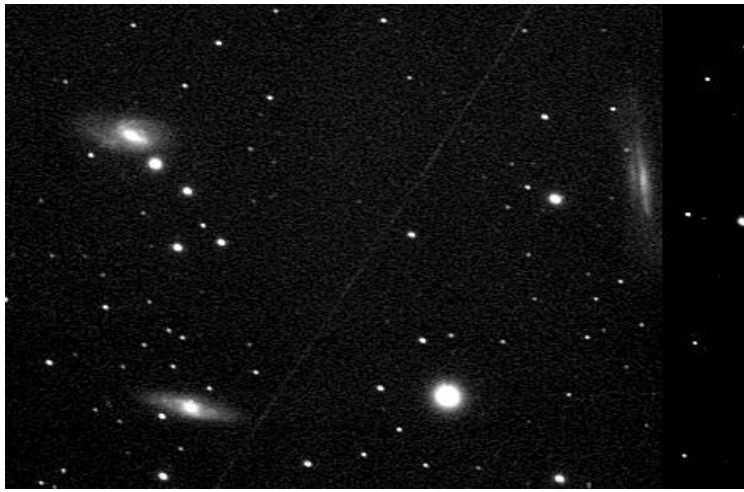


**OBSERVING SESSIONS ON HEADLEY HEATH** will be held monthly [Sept to May] on dates noted on the EAS Diary at the 'dark of the moon' at NT carpark adj cricket pitch. Phone 01252 382940 from 7pm to check meeting is on.

**THE USERS GROUP MEETING** is held on Wednesdays from 8pm sharp on alternate months on dates noted on the EAS Diary in the School's Geography Room via Main School Entrance facing playing field -map [www.ewell-as.co.uk](http://www.ewell-as.co.uk)

*Prominences on the sun - 2008 Feb 10 via Coronado 40mm PST + Nikon digicam afocal to eyepiece @ Ewell Court Ob – Ron Johnson.*





## OBSERVING SESSION AT HEADLEY HEATH

2008 March 4 by James Gordon

Mike Fantham could not make it tonight but in attendance were Clive Cook and Alex Mirza and myself, of course. The low turnout was expected as it was cloudy and even started snowing once I got there! However, the gods were smiling, the clouds disappeared and the universe appeared - apart from where it was masked by light pollution!

<Leo Trio via ETX-70 @ WorcesterParkOb -Maurice Gavin

binoculars. Objects such as the **Double Cluster in Perseus** had a 3-dimensional feel. All the objects viewed and reported tonight were galaxies with the exception of planetary nebula **M97** in Ursa Major. Clive had a wealth of target galaxies to satisfy his 16" Orion Optics Dobsonian. Lastly, I set up the !0" Celestron Newtonian on CG5 equatorial mount. Tonight the goto function on my 'scope was working very well. First target **M81** was right in the centre. Looked for **NGC 3077** nearby and it was visible with direct vision. Later, after 12pm I looked again and it appeared much brighter, moving high into a less light polluted part of the sky. The whole group, **M81** and **M82** showed much detail. The consensus was, not surprisingly that more detail, especially dark lanes in **M82** were visible in the 16".

Alex was using his new 100mm Helios Quantum-5

Next target was **NGC 2683** [below] -this galaxy showed some detail visually - and is more impressive than some Messier galaxies, in my opinion. I'd started some images for awhile. Clive confessed to looking at Saturn - I thought, with Mike absent this was a deep sky session! [Sorry Mike]. Alex shrieked 'wow' as I glimpsed the end of a **bright fireball** heading north, sometime between 10-11pm. Alex estimated it as at least mag-3.



Other highlights for the 16" scope were the '**Leo trio**' of **M65**, **M66** and often elusive **NGC 3628** [above]. Beneath the *bowl of the Plough* **M108** showed some mottling and nearby planetary nebula **M97** was easily visible - they say it's the hardest Messier object but what about **M101**, **M74** or **M83** in this context. **NGC 4565** was faint, but elongated. Later on **M51** [see front cover] was high and the oval shaped was clear. I would not like to say convincingly that spiral arms were visible, but they were close. This is good for this site. A number of galaxies in Leo and Virgo were observed but identifying some would be a challenge! The *Sombrero* **M104** was distinct although I cant see 'the hat' visually. Clive tried for '**the mice galaxies**' in Corvus but to no avail. All in all - a good session.

<NGC 2638 in Lynx- 25cm Celestron Newtonian @ Albury Heath - James Gordon

## HEADLEY HEATH v ALBURY HEATH – which is better?

*Clive Cook emails:* With regards Albury over Headley - I find that the usual Messier's have better visual resolution and also the Herschel objects are more prominent even with a 10", eg, NGC 3190/3193 galaxies of around mag 11 situated midway between Gamma and Zeta Leonis stand out but at Headley a bit difficult! I think Albury Heath is worth the extra travel but the problem is having to drag yourself away on a good night if you have to get up early that morning!

**EWELL AS SUBSCRIPTIONS:** The Society annual subscriptions are due on January 1st. Please forward your sub [member £15; family £18; junior £5 made payable to Ewell Astro Soc] to...

EAS Treasurer - Valerie May, 41 The Green, Burgh Heath, Tadworth, Surrey KT205NP; phone: 01737361486

## JANUS CONTRIBUTIONS – CAN YOU HELP?

*Janus* always needs your contribution for *your newsletter!* If you have any astro observations, pictures, articles or notes please email it to [mgavin@ntlworld.com](mailto:mgavin@ntlworld.com) or hand it to Maurice Gavin on a floppy disk or CD. Thanks.

**SOCIETY INSURANCE** - The Society's personal liability insurance is covered by the Nonsuch HS insurance but only for event on the school's premises. Outside visits, like observing sessions etc, are at the members/ visitors own risk.

## SYNCHRONOUS ROTATION & ORBITS by Alan Lane

You may recall that our February speaker, Dr Collinson, spoke about of the tasks of the Solar Orbiter, one of which was to make a number of synchronous orbits of the sun in the ecliptic plane. [Oh ! ,you don't recall and you were not there anyway ? -- it doesn't matter because you can read all about it in Janus below.] An object in synchronous orbit takes the same time to go round as the body it orbits takes to rotate on it's axis. There is a lot of them about these days [including the Moon -Ed]. The earth is surrounded by host of synchronous communication satellites, hovering over the equator, bringing us instant news, telling us where we are and forwarding telephone calls from around the globe. You don't get many phone calls from abroad? No, the only ones I get are telling me I have won a huge prize, but it never arrives.

They must be sent by the space junk. As Dr Collinson explained, because it remains over the same spot on the observed body, the cameras and other instruments on a mission satellite in synchronous orbit can make a long term examination of a particular area without the irritation of that area disappearing over the limb. In order to remain in the correct orbit the satellite must be at a particular distance from the object of study. This depends on the mass of the body being orbited. Fortunately within the solar system we can use the orbits of natural bodies and Kepler's Third Law, [the one that says there is a constant relationship between the cube of the mean distance of the orbiting object and the square of the orbital period ] to work out the radius of a synchronous orbit. In the case of earth satellites this is about one ninth of the distance of the moon. One earth sidereal rotation is 0.0365 of a lunar sidereal orbit, so square that and find the cube root of the answer. You can't be bothered? No, I don't know why I am really. Anyway it is just about 0.11 or 42,000 km. This is known as the Clarke orbit, presumably because [the now Sir] Arthur C Clarke worked it out before I did, about 60 years before actually, in 1948. I think I was reading a book about Martians about then, nice, peaceful ones, not at all like H G Wells creatures. That was just as well, otherwise I might have been put off astronomy!

The sun does not rotate as a solid body, the equatorial region turns faster than the poles. The mean sidereal rotation of the sun is 25.38 earth days. That works out at 0.07 of one earth year. So, square that and you get 0.0049, the cube root of which will be the radius of a synchronous orbit around the sun expressed as a proportion of one AU, the distance of the earth from the sun. I make that 0.17 or about 25 million km. However the sun rotates ever more slowly at higher and lower latitudes, reaching some 30 earth days near the poles, over 0.08 of a year. This pushes the synchronous orbit out to 0.19 AU, 28 million km. Dr Collinson said the Solar Orbiter would be at 0.2 AU so possibly he was speaking of an average distance. Possibly the other orbits, such as the polar, differ in radius, and different orbits would be required to match the slower bands of solar rotation away from the equator. Of course it could be that I have got it wrong. Any second opinions?

**MEMBER'S REPORT... Total Lunar Eclipse 2008 Feb 21<sup>st</sup>**

*Members Ron Johnson-Ewell, Gerard O'Mara-Southampton, Jack Lee-SW London and the Editor-Worcester Park reported being completely clouded out for the eclipse but Gary Walker emails: Despite very poor conditions, I did manage to see part of the lunar eclipse from my Banstead home! A layer of stratocumulus had rolled in before the eclipse started, but it had a few small breaks (or rather cracks, in it!), so the moon was visible, intermittently.*

At first, the fact that even when the moon appeared in a break, it was never entirely out in the open, made it difficult to tell, if I could see the partially eclipsed portion of the moon, or whether it was cloud hiding it! I could often just see the moon as an arc going three-quarters of the way around, but with a western part, missing! However, at latter stages, I could see the un-eclipsed portion of the moon appearing as a narrow crescent. Even at totality, when I had not expected to see anything, the moon did manage to punch through the clouds intermittently. This must have been a bright totality, for it to appear so! I could not see more than a hint of the moon's colouration, due to the conditions, but I took some photographs. Some of these show the moon fairly well, appearing a reddish-orangey-brown in colour. At times the moon appeared fuzzy, presumably due to cirrus cloud above the stratocumulus cloud.

The earth's shadow moved from east to west on the moon, and the returning light of the moon, at the end of totality appeared on the southern limb. The weather conditions were very poor from the start of the umbral phase at 1.43am, so the start of the eclipse was obscured but conditions improved later on. I saw post-totality partial phases quite well (ie. from ~3.50-4.59am). Thus I saw the end stages of the eclipse too. After the umbral pass was over the full moon even appeared in a clear patch, despite its low altitude by then. – typical ! I observed the eclipse mostly with my 11 x 80 binoculars, but occasionally with my 8" SCT at x66. Thus staying up was not a total waste of time but it was frustrating!

**COSMIC-RAYS – "OH MY GOD PARTICLES"** by Maurice Gavin

Perhaps I'm not alone in my confusion with physicist's proposition that *light* can be considered either a 'photon particle' or 'wave motion' *depending on the circumstances*. I can handle the wave option better as the wavelength defines the 'colour' where shorter wavelengths are blue then violet progressing into the invisible ultra-violet [UV]. Ever shorter wavelengths progress through far-UV to X-rays and finally Cosmic-rays.



< M87 jet -image Hubble ST & inset M87 jet- WPO - 30cm SCT – M.Gavin  
 Fortunately for us these 'damaging' rays are blocked by our atmosphere at ground-level. But it appears that Cosmic-rays are not rays at all but 'proton particles' moving at enormous velocities approaching light-speed and can arrive only a few centimetres behind the weightless photon counterpart travelling at light-speed for millions of years! At such velocities even the tiny proton's mass can pack a mighty punch equivalent to a baseball strike - hence *Oh my god particle* description!

A recent source of Cosmic-rays is thought to be contained in the jet emanating from the black-hole core of the galaxy M87 in Virgo – see [en.wikipedia.org/wiki/Elliptical\\_Galaxy\\_M87](http://en.wikipedia.org/wiki/Elliptical_Galaxy_M87) and [www.aip.org/png/html/m87jet.html](http://www.aip.org/png/html/m87jet.html)

**SOLAR ORBITER talk by Dr Glyn Collinson MSSL** on 2008 Feb 8 recorded by Alan Lane

Dr Glyn Collinson of the Mullard Space Science Laboratories - Dorking spoke to the meeting about the new ESA's *Solar Orbiter Mission* to the sun. Dr Collinson described MSSL as the largest UK research group. Its part in the mission was to design and test instruments to be carried by the *Orbiter*. There had been a number of previous missions directed at the sun, in particular NASA's SOHO. All of these gathered information at some distance from the object of study.

The ESA's OMS was intended to get closer in, orbiting the sun at 0.2 AU ( 30 million km). Dr Collinson then talked about the features and activity of the sun that OMS was to examine. The OMS was programmed to orbit the sun in both polar and ecliptic plane. In the ecliptic it would orbit synchronously with the sun's rotation so that solar activity at any point on the surface could be followed continuously. The polar orbit would be able to study clearly areas difficult to see from Earth. He spoke then about the corona, the surrounding pearly luminous gas that can be seen during a total eclipse of the sun. The temperature of the corona is in millions of degrees Kelvin, [K] far higher than the surface of the visible sphere which is about 6000 degrees K. It was thought that this relates to the sun's magnetic field, OMS would seek to confirm how this mechanism works.

This next subject of interest were the solar wind particles, which, despite having a density only a tiny fraction of that of the Earth's atmosphere, were thrown out of the sun with enormous force. Although most of the solar wind that fell upon the Earth was deflected by our planets' magnetic field, some sometimes get through and can cause serious damage to electrical supply and communication. Dr Collinson cited the breakdown of power supply in Canada in 1989. The most dramatic visible phenomena associated with the solar wind are the aurora or Northern and Southern Lights, caused by solar wind particles being drawn down to the poles by the Earth's magnetic field where interaction with the atmosphere releases photons of many wavelengths including visible. For reasons as yet unclear the solar wind comes in two separate speeds, *slow* and *fast*, imaginatively named, said Dr Collinson, eg the *Fast Wind* and the *Slow Wind*. The *fast wind* travels at 700 km/s and the *slow* at 200km/s. All this activity came under the heading of *Space Weather*.

Sunspots have been observed for centuries and have been the subject of much speculation. One 17<sup>th</sup> century observer was quite convinced that the sun had a dark inner sphere which was exposed by holes (the sunspots) in the bright outer shell. Sunspots usually form in pairs which are now thought to be either end of huge magnetic loops which rise and fall thousands of kilometers from and back to the surface. Dr Collinson then showed a diagram of the electromagnetic spectrum illustrating the small range of wavelengths occupied by visible light. Photographs of the sun taken in various wavelengths showed the apparently calm sun as seen by our eyes (don't look without proper eye protection!) and the turmoil of activity in short wave such as UV and X-ray.

One of the instruments to be carried by the Solar Orbiter is a collimator designed to measure the speed of electrons emitted by the sun. Dr Collinson showed a simplified diagram of this instrument. Electrons are drawn across the top of a magnetized hemisphere which can be adjusted to pull down those travelling at a particular speed where they strike an electro-sensitive pad at the base of the hemi-sphere. Electrons moving too fast pass the magnet and escape, those moving too slow are trapped on the magnet. The instrument can then read the proportion of electrons travelling at a given speed.

#### **SOCIETY LIBRARIAN – LOUIS BARMAN**

Let me introduce myself - I am Louis Barman the new Society Librarian and I'll be looking after all the wonderful books, DVD's and Videos in the **Society Astronomy library**. I am busily sorting through the books and DVD'S (and VHS Videos) and producing a list of the publications that are in the library.

At the next monthly meetings I will put on display (from the coffee break onwards) a small but varied selection of the Society books. If you have been a member of the Society for longer than six months and you wish to borrow one of these books then please speak to me (here is my picture for those of you who do not know who I am) and I'll do my best to arrange it.

A bigger selection of the Astronomy library books have been moved into a convenient bookcase located in the classroom opposite the monthly meetings. Please speak to me if you wish to see these books.

**GOT ASTRO ITEMS FOR SALE?** – place a free advert in *Janus* via the Editor !

