

# SPACEWATCH

the newsletter of the Abingdon Astronomical Society

8<sup>th</sup> December 2008

Stan Cocking Memorial Lecture:  
Prof. James Binney  
(University of Oxford) –  
'The Milky Way'

Over the last few weeks you may have seen Venus and Jupiter approach and pass one another, as Venus comes out from behind the Sun and catches us upon our annual orbital journey, and we in turn leave Jupiter behind to disappear again behind the Sun. When they were close, and especially when the Moon was close by, you can easily see the line formed by the plane of the planets' orbits (including the Earth's). This is known as the ecliptic. I sometimes like to tilt my head and imagine the vast plane of our solar system.

Another plane, at a higher angle to the horizon, is formed by the Milky Way (*Galaxias* in ancient Greek). It is the plane of our Galaxy. The ancients used to say that it was a river of milk bringing life down from the heavens to the Earth. Today we know that it is the effect of thousands of stars. Large telescopes reveal many millions of stars, and in fact the Galaxy contains around one hundred thousand million stars, and is known to be only one of around a hundred thousand million galaxies in the observable universe.

Tonight Professor James Binney from Oxford University will tell us more about our Galaxy. It may only be one of billions, but it is ours, and therefore very special to us.

May I take this opportunity to wish you all a Merry Christmas and a Happy New Year!

## THE NIGHT SKY THIS MONTH

by Bob Dryden

**Sun + Earth:** On 21<sup>st</sup> December at 12.04 UT the Sun reaches its most southerly point, in Sagittarius. This marks the winter solstice and it means the days will slowly be getting longer again. While you stand outside looking at the stars on the 4<sup>th</sup> January, freezing to death, bear in mind that on that date the Earth is at its closest to the Sun.

**Mercury:** After being absent from view for a little while, Mercury now reappears in the evening sky, reaching greatest eastern elongation on 4<sup>th</sup> January at an angle of 19°. It will remain fairly low in the south west but you should be able to find it easily enough in binoculars. You can use brighter Jupiter as a guide because from 29<sup>th</sup> December to 3<sup>rd</sup> January both planets are quite close together in the sky. In fact, on the evening of the 29<sup>th</sup> there will be a very nice grouping of Jupiter, Mercury, and a thin crescent Moon. They will be rather low down so you will need to look immediately after sunset.

**Venus:** At magnitude -4.1 it is now hard to miss Venus as it shines brightly towards the south west after sunset. This session it crosses Capricornus and Aquarius which means it is gaining height rapidly. At sunset on 8<sup>th</sup> December Venus is 15° high, and by 12<sup>th</sup> January at the same moment it will be 30° high. The phase of Venus is decreasing noticeably too. While quite gibbous in early December, it is much closer to half phase by mid January. It is growing in apparent size as well as its orbit is bringing it closer to Earth, reaching 23 arc minutes across by mid January. The evening of 29<sup>th</sup> December brings a nice pairing of Venus and a crescent Moon which should be a pretty sight.

**Jupiter:** While still on view, Jupiter is rapidly moving into the Sun's glare. So look for Jupiter in December as by January it will be all but lost from view.

**Saturn:** Still in Leo (but approaching the border with Virgo), Saturn is slowly moving towards the evening sky. It rises about 22.00 UT by mid January so making it easier to view. However, the rings are now virtually edge on to us so most people will not be able to see them for awhile now. However, there are still the satellites to look for and one, Titan, is even visible in binoculars if you can hold them steady enough.

**Uranus + Neptune:** Both these planets are approaching the solar glare and this is your last chance to have a look at them this apparition. Binoculars and a finder chart are all you need to see them.

**Occultations:** On 13<sup>th</sup> December epsilon Gemini is occulted by the Moon at 21.07 UT, and it reappears again at 22.09 UT. This star is a bright +3.2 magnitude and normally a pair of binoculars would enable you to watch the occultation. However, as the Moon is at full phase, its glare will probably mean that a small telescope will be needed instead.

January 7<sup>th</sup> brings another occultation of the Pleiades star cluster. Only this time, it all happens at a much more sociable time. The occultation begins at about 16.50 UT and goes on until about 18.25 UT. During that time several members of the cluster will be covered by the Moon, and several stars will reappear again from the trailing edge. The brightest star occulted is Alcyone which is 3<sup>rd</sup> magnitude and it happens at 17.44 UT. The Moon will be gibbous and approximately 40° to 50° high at the time.

**Meteors:** Normally the Geminid meteor shower is well worth looking at as it produces around 100 meteors an hour at maximum on 13<sup>th</sup> December. However, this year the Moon is 15 days old on that date, in other words, full Moon, and it will be extremely difficult to see many shooting stars as a result.

From December 17<sup>th</sup> to 25<sup>th</sup> the Ursid meteor shower is active with the maximum occurring on the 22<sup>nd</sup>. The maximum hourly rate is only 10 though so the show is not usually very spectacular. The Moon does not rise until 03.30 UT on the 22<sup>nd</sup> so there is a nice dark period in which to watch for them.

The Quadrantid meteor shower has a lot of meteors, often as many as 100 an hour, but you will have to watch for them after midnight to get the best results. The shower is active from January 1<sup>st</sup> to 6<sup>th</sup> and maximum activity occurs on the 3<sup>rd</sup>. The Moon will be out of the way as it sets around 22.30 UT so giving you a dark sky for the rest of the night.

**Asteroids:** Pallas has now moved too far south for us here in the UK but Ceres and Vesta are still on view. Ceres is in Leo at about magnitude +8.2 (still slowly getting brighter) while Vesta is on the Pisces/Cetus border. Vesta fades from magnitude +7.2 to +7.8 by mid January. Finder charts and binoculars will enable you to find these two lumps of rock orbiting the Sun.

### MOON PHASES:

Full: 12<sup>th</sup> Dec.; Last Qtr: 19<sup>th</sup> Dec.; New: 27<sup>th</sup> Dec.; 1<sup>st</sup> Qtr: 4<sup>th</sup> Jan.; Full: 11<sup>th</sup> Jan.



### WHAT HAPPENED TO COMET HOLMES?

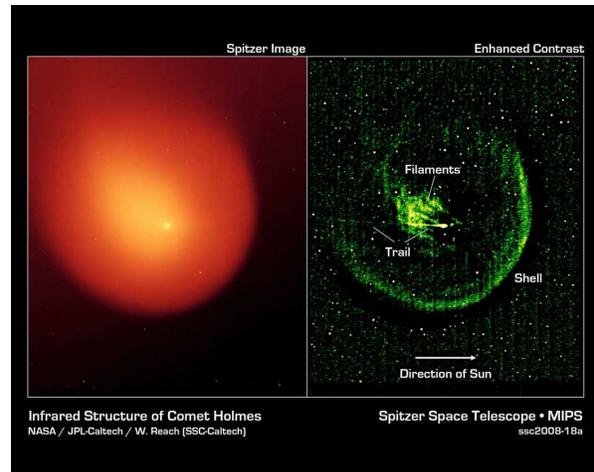
by Dr Tony Phillips

One year after Comet 17P/Holmes shocked onlookers by exploding in the night sky, researchers are beginning to understand what happened.

“We believe that a cavern full of ice, located as much as 100 meters beneath the crust of the comet’s nucleus, underwent a change of phase,” says Bill Reach of NASA’s Spitzer Science Center at the California Institute of Technology. “Amorphous ice turned into crystalline ice” and, in the transition, released enough heat to cause Holmes to blow its top.

Anyone watching the sky in October 2007 will remember how the comet brightened a million-fold to naked-eye visibility. It looked more like a planet than a comet—strangely spherical and utterly lacking a tail. By November 2007, the expanding dust cloud was larger than Jupiter itself, and people were noticing it from brightly-lit cities.

Knowing that infrared telescopes are particularly sensitive to the warm glow of comet dust, Reach and colleague Jeremie Vaubaillon, also of Caltech, applied for observing time on the Spitzer Space Telescope—and they got it. “We used Spitzer to observe Comet Holmes in November and again in February and March 2008,” says Reach.



*Comet Holmes as imaged by the multiband imaging photometer (MIPS) on the Spitzer Space Telescope. The enhanced contrast image at the right shows the comet’s outer shell and mysterious filaments of dust.*

The infrared glow of the expanding dust cloud told the investigators how much mass was involved and how fast the material was moving. “The energy of the blast was about  $10^{14}$  joules and the total mass was of order  $10^{10}$  kg.” In other words, Holmes exploded like 24 kilotons of TNT and ejected 10 million metric tons of dust and gas into space.

These astonishing numbers are best explained by a subterranean cavern of phase-changing ice, Reach believes. “The mass and energy are in the right ballpark,” he says, and it also explains why Comet Holmes is a “repeat exploder.”

Another explosion was observed in 1892. It was a lesser blast than the 2007 event, but enough to attract the attention of American astronomer Edwin Holmes, who discovered the comet when it suddenly brightened. Two explosions (1892, 2007) would require two caverns. That’s no problem because comets are notoriously porous and lumpy. In fact, there are probably more than two caverns, which would mean Comet Holmes is poised to explode again.

When?

“The astronomer who can answer that question will be famous!” laughs Vaubaillon.

“No one knows what triggered the phase change,” says Reach. He speculates that maybe a comet-quake sent seismic waves echoing through the comet’s caverns, compressing the ice and changing its form. Or a meteoroid might have penetrated the comet’s crust and set events in motion that way. “It’s still a mystery.”

But not as much as it used to be.

See more Spitzer images of comets and other heavenly objects at [www.spitzer.caltech.edu](http://www.spitzer.caltech.edu). Kids and grownups

can challenge their spatial reasoning powers by solving Spitzer infrared “Slyder” puzzles at <http://spaceplace.nasa.gov/en/kids/spitzer/slyder>.

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

## LAST MEETING'S TALK

by Gwyneth Hueter

Last month's talk was given by James Fradgley (Wessex AS), about life in the universe.

It's nice to be reminded of how fragile and ephemeral we humans are and how we are a result of so many chance occurrences. This was the nature of Mr Fradgley's talk and I'm not ashamed to admit to some writer's licence in shuffling his thoughts around to make this more interesting for those of you who weren't at the talk.

So, after building up the excitement, JF started by 'stating the principle of mediocrity' as he calls it: 'we're nothing special' and how average is the Sun? (Very). He then talked about where *not* to look for life, and used M83 as a sample galaxy because it's very similar to our Milky Way.

- Not old stars, which don't have enough iron, or hot stars, or close binary stars
- Not too near the galactic centre, where there's too much happening
- Away from some gas clouds, because they may have too much radiation

And then what about the planet itself? Apply the 'Goldilocks principle' – the temperature has to be just right. And a moon to help keep the planet stable in its axis. And a few nice big gas giants orbiting further out in its solar system; their gravity attracts debris away.

JF had also mentioned the Drake Equation earlier, another old faithful formula which tries to calculate the chances of there being other civilisations out there. He worked through it, starting with suitable stars, then stars with planets, planets that are Earthlike, where life develops, where intelligent life develops, where technology develops, and finally (phew!) where its civilisation develops enough to communicate with other communicating civilisations. The general consensus is that there must be many, but where are they? (Fermi's Paradox: 'if they're out there, why aren't they here?')

Two other humbling pearls of wisdom were, if the Earth's existence were compressed into 12 hours, the first modern humans appeared one third of a second ago. And our Sun may be only half way through its ten billion year lifetime, but it's been brightening steadily and in the next 150-250 million years, it will get too hot for life on Earth to survive.

After the break, we were treated to another informative talk from our own Andrew Ramsey, who gave us an update on the Antikythera Mechanism. Specifically, how eight tonnes of X-ray scanning equipment had to be carted over to Greece, from

Tring. (After the Elgin Marbles debacle, the Greeks don't trust us any more.) The mechanism is covered in corrosion deposits but it's now been discovered that there are instructions written on it in a Sicilian Greek dialect and that its designers were able to copy the Moon's elliptical orbit so precisely that they could use it to make eclipse predictions. They understood the Solar Saros cycle well enough to be able to predict eclipses even if they happened on the other side of the Earth.

See [www.antikythera-mechanism.gr](http://www.antikythera-mechanism.gr) for more information.

## FURTHER DISCUSSION

If you are not already on our internet mailing list, then why not log on to YahooGroups. The list is called 'abingdonas'. Members use the list to alert each other about celestial events and to chat about amateur astronomy. The list is quite active, with several messages most weeks. To read through previous messages click on <http://groups.yahoo.com/group/abingdonas/>.

To join the abastro list, please go to <http://www.yahogroups.com>. You can also unsubscribe from the list here. To post messages to the list, please send them to [abingdonas@yahogroups.com](mailto:abingdonas@yahogroups.com). Please note that you will need to sign up with a YahooID if you do not already have one. You can do this on the above page.

Further information about the mailing list can be found on the abingdonas webpage at: <http://groups.yahoo.com/group/abingdonas/>.

Further discussion on astronomy and many other topics takes place at the Spread Eagle pub in Northcourt Road after the meeting. You are most welcome to join us.

## DATES FOR YOUR DIARY

**15<sup>th</sup> Dec.** 8pm. Beginners' Meeting in the Perry Room.

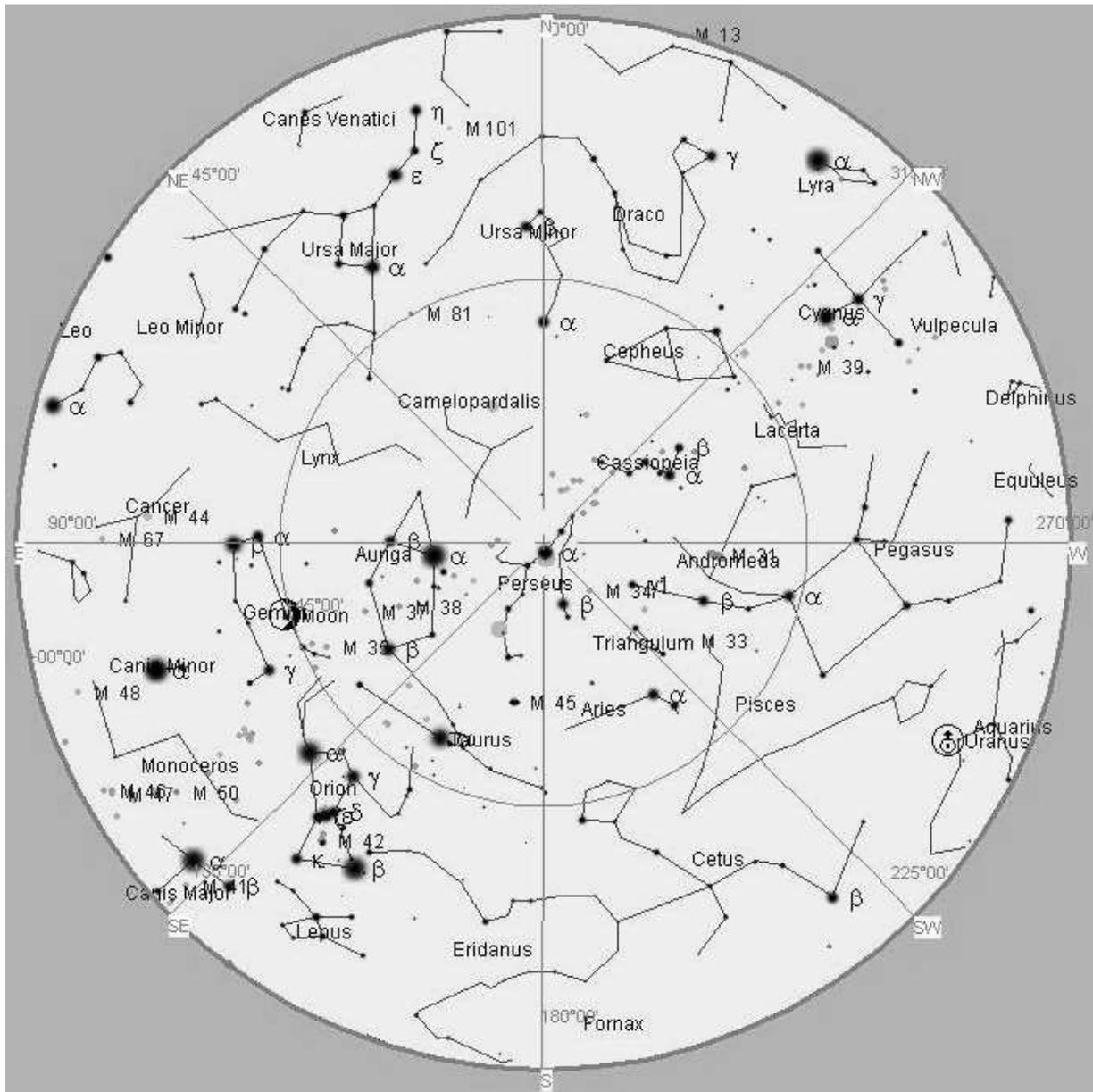
**Friday 9<sup>th</sup> Jan.** 7pm at the Rutherford Appleton Laboratory – Newbury AS invite you to a talk by Dr Francisco Diego (UCL), "**Creation by Evolution** – Assembling the Universe from the simplicity of pure energy to the complexity of the human brain" (observing afterwards). Contact Ann Davies on 01635 30598 or e-mail: [anndavies@dsl.pipex.com](mailto:anndavies@dsl.pipex.com).

**12<sup>th</sup> Jan.** 8pm Speaker meeting: Stuart Clark 'The Sun Kings'.

There is no observing evening this month.

The editor of "SpaceWatch" is Andrew Ramsey, who would very much appreciate your stories & contributions. Please send any news, observations, photos, etc. to:  
Mail: A.T.Ramsey, 35 Cope Close, OXFORD, OX2 9AJ.  
E-mail: [AbAstro@ATRamsey.com](mailto:AbAstro@ATRamsey.com)  
Phone: 01865 245339

## STAR CHART



**The Night Sky at 10pm (GMT) next Saturday (13<sup>th</sup> December)**

Venus and Jupiter have set earlier in the evening. Orion is beginning his winter journey and rising high in the south-east, with the Pleiades in Taurus even higher in the south. The gibbous Moon in Gemini will drown out a lot of the fainter stars, but sweep binoculars right overhead from south-east to north-west – this is the Milky Way, the mid-plane of our galaxy. You will not see it by eye tonight, but binoculars will show a myriad of stars.