

## Society News

Even with the recent bad weather the observatory has been a pretty busy place.

In February, we had 4 organised visits and a steady trickle of ad-hoc visitors which resulted in a healthy increase in donations to the Society. There are more visits arranged and these are listed overleaf (*page 2*).

## Telescope News

A week or so ago we had some strange problems with the Meade LX200 meaning it was taken out of service for a few days. The fault was serious as the telescope would not turn on at all! Investigation did not identify anything amiss externally so we had no choice but to remove everything “above the wedge” from the pier and perform further tests “on the bench”.

With covers removed, all connections were checked, cleaned and an internal battery replaced. No fault was found but once reassembled the telescope operated correctly and eventually the decision to remount it was made. All operated correctly - the only concern then was the power supply which was a large but electrically underpowered unit from RS components. On load measurements proved the telescope demanded almost 4x the stated rating of the PSU. That has now been replaced with an approved Meade unit with a suitable rating and much safer cabling.

Everything is now back to normal except that, until we have done some recalibration, we may have a telescope appears to drift over time.

*Thanks to everyone who helped with this.*

## Weather..

After all the rain and snow, we have seen a bit of a settled period in the last week or so which has allowed us to get a few telescopes out on Thursday evenings.

Please support us by coming along, we have plenty of equipment just crying out to be used and there’s plenty of space outside!

*Clear Skies!*  
*Brian Curd*  
*Observatory Director*

## VAS Website: [www.wightastronomy.org](http://www.wightastronomy.org)

Submissions or letters to New Zenith are always welcome and should be sent to:

**The Editor New Zenith**

**35 Forest Road**

**Winford**

**Sandown PO36 0JY**

Tel: **01983 864303** or email: [editor@wightastronomy.org](mailto:editor@wightastronomy.org)

Material for the next issue by the 6th of the month please.

## VAS Registered Office

35 Forest Road, Winford, Isle of Wight, PO36 0JY

The Vectis Astronomical Society and the Editor of the New Zenith accept no responsibility for advice, information or opinion expressed by contributors.

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## Observatory Diary

Monday, 19.30hrs	Members Only by arrangement Telescope and night sky training. Contact Barry Bates 01983 872979
Thursday, 19.30hrs	Members and Public. Informal meeting and observing.

## Contents this Month

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## Monthly Meeting Calendar 2013

Check the website for up to the minute information.

Travel for our monthly speakers is sponsored by:		
		
Date	Subject	Speaker
22 Feb	Galaxy and Mass Assembly	Dr Jon Loveday
22 Mar	Active Galaxies	Nick Hewitt
Apr	Answering the biggest questions with the biggest surveys Pt II	Dr Tom Kitching
May		
Jun		
Jul		
Aug	AGM - Start at 19.00hrs	
27Sep	History of the Dark Sky	Alan Dowdell
Oct		
Nov		

*All details correct at time of publication.*

### Do You Know a Speaker?

As you can probably see, we have some spaces at the moment. If you know anyone who can help, or perhaps you would be prepared to have a go, please contact Elaine Spear at [progorg@wightastronomy.org](mailto:progorg@wightastronomy.org)

### Sponsor

Over the last few years we have been lucky enough to have our speakers travel to the IW sponsored by WightLink. Unfortunately, the economic situation has forced them to review all concessionary travel after March.

We can only hope that the current arrangements will continue and thanks WightLink for their support to date.

### VAS Contacts 2013

Chairman	Bryn Davis <a href="mailto:chairman@wightastronomy.org">chairman@wightastronomy.org</a>
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NZ Distribution	Brian Bond <a href="mailto:distribution@wightastronomy.org">distribution@wightastronomy.org</a>
Others	Barry Bates Mark Williams

### Observatory Visits Booked

We have bookings for the observatory on the following dates - Visits by external groups are important to fund raising, please try to avoid using the facilities on these dates.

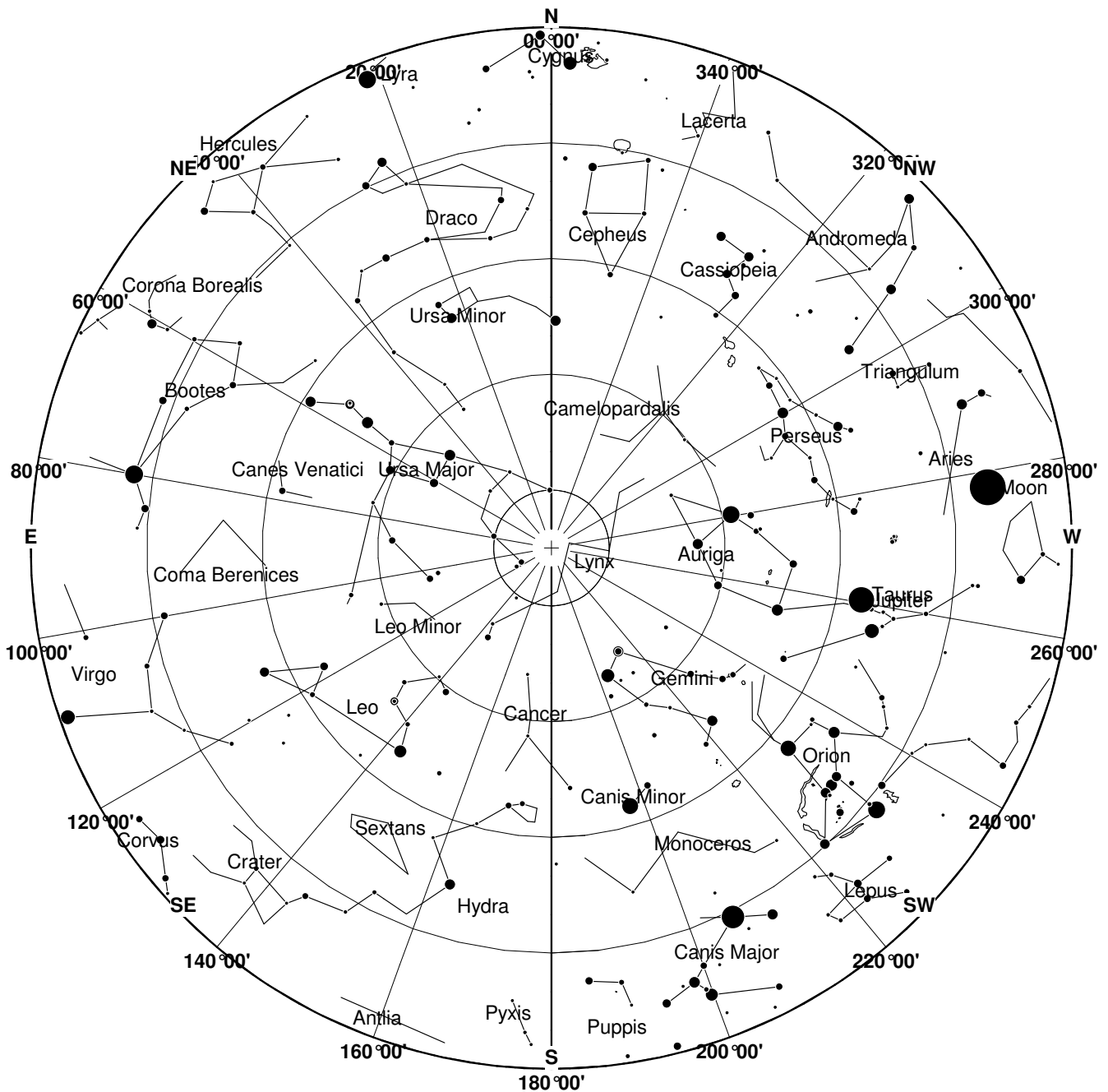
Day & Date	Booking Group
Tue 26 Feb	1st Lake Brownies - 17.30-19.00
Wed 13 Mar	7th Newport Scouts - 19.00-20.30
Wed 20 Mar	VAS Committee - 19.30-21.00
Tue 26 Mar	Cowes Wine Club - 19.30-22.30
Thu 16 May	VAS Member's BBQ - 19.30-22.00

*All details correct at time of publication.*

### Stunning backyard photos

<http://www.avertedimagination.com/>

# March 2013 Sky Map



View from Newchurch Isle of Wight UK - 2100hrs - 15 March 2013



**Messier 81 (also known as NGC 3031 or Bode's Galaxy)** was first discovered by Johann Elert Bode in 1774 and is a spiral galaxy about 12 million light-years away in the constellation Ursa Major. Due to its proximity to Earth, large size and active galactic nucleus (which harbours a 70 million solar masses supermassive black hole), Messier 81 has been studied extensively by professional astronomers. The galaxy's large size and relatively high brightness also make it a popular target for amateur astronomers.

*This article is licensed under the [GNU Free Documentation License](https://www.gnu.org/licenses/fdl.html).  
It uses material from the Wikipedia article "Messier 81"*

## March 2013 Night Sky

### Moon Phases

New	1 <sup>st</sup> Qtr	Full	Last Qtr
11th	19th	27th	4th

The vernal equinox is at 04:55 on March 20th. This is the point at which the Sun crosses the equator and day and night have equal length.

### Comet PANSTARRS

If the predictions about this comet are correct then there should be a spectacular comet to grace our evening skies throughout March.

At the time of writing, the start of February, the comet is within range of binoculars, but is about 4 magnitudes below earlier predictions. Perhaps we will not be treated to 'the comet of the century' after all. It will only be visible to us northern hemisphere after perihelion when there is a chance that it may brighten considerably. We can only hope that in the coming weeks it makes a dramatic improvement in brightness. Look low down in the west shortly after sunset from the 7<sup>th</sup> onwards, probably the earliest opportunity to spot it when it sets only 20 minutes after the Sun. On the 12<sup>th</sup> & 13<sup>th</sup> the crescent moon is close by making for a good photo opportunity.

Altitude & Azimuth of Comet PANSTARRS 30min After Sunset					
Date/Time	Az	Alt	Date/Time	Az	Alt
8 <sup>th</sup> 18:28	255	0.5	20 <sup>th</sup> 18:47	282	15
10 <sup>th</sup> 18:31	259	4	22 <sup>nd</sup> 18:51	287	16
12 <sup>th</sup> 18:34	263	7.5	24 <sup>th</sup> 18:54	291	16.5
14 <sup>th</sup> 18:37	268	10	26 <sup>th</sup> 18:57	296	17
16 <sup>th</sup> 18:41	273	12	28 <sup>th</sup> 19:00	299	17.5
18 <sup>th</sup> 18:44	278	13.5	30 <sup>th</sup> 19:04	303	18

### Planets

#### Mercury

After last months poor showing in the evening sky Mercury makes an even poorer appearance in the morning sky towards the end of this month. At our latitude it will not be visible being at best only about 5 degrees above the horizon at sunrise.

#### Venus

As Venus passes behind the Sun it will not be visible for the next few months until it reappears as the evening star in early May.

#### Mars

Mars is too close to the Sun in the evening sky to be visible.

#### Jupiter

Jupiter is well placed for observation high in the south western sky after sunset. It is very bright and an obvious object in this part of the sky.

#### Saturn

Noticeably yellow in colour low down in the south during the early hours after midnight Saturn lies in the constellation of Libra about half way between the bright stars Antares and Spica, the brightest stars in Scorpius and Virgo.

#### Uranus & Neptune

Both outer planets are too close to the Sun to be observed until late summer.

### Deep Sky Objects

#### M44 Beehive Cluster. RA 8h 41m Dec 19°44' Mag 4.0

This cluster which has been known since ancient times is easily visible to the naked eye as a faint round patch of nebulosity in the centre of the constellation of Cancer. In view of its large size, more than twice the diameter of the full moon, it is best viewed with binoculars, or to show more bees swarming around the hive a low power telescope. Being located in an area of sky with a low star density this cluster stands out readily against the background sky.

#### M67 King Cobra Cluster R 8h52m Dec 11°50' mag 7.5

About a fist width south of M44 is M67, a much smaller and fainter cluster that although visible in binoculars is best viewed through a small telescope. The brighter members trace out two loops of stars that are reminiscent of the markings on the hood of an angry cobra. You won't get bitten; fortunately this snake is at a very safe viewing distance; about 2700 light years.

#### M81 Bodes Galaxy RA 9h55m Dec 69° 2' mag 8.5

One of the brightest galaxies in the Messier catalogue it can be seen against dark skies in binoculars. M81 is an almost face on spiral galaxy with two prominent arms, these along with traces of dark dust lanes can be seen in larger telescopes. Smaller 'scopes show an oval smudge with a hint of spiral arms and a bright core.

*Peter Burgess*

## Mapping the Universe

Lecture report 25 January 2013

**Dr. Rita Tojeiro**

**Institute of Cosmology & Gravitation (ICG)  
Portsmouth**

This lecture included several short movies and computer simulations and was well-received by a full house, with plenty of new faces, reflecting an increasing enthusiasm unblunted by January weather. Out of the ICG, with their involvement in big projects such as the Sloan Digital Sky Survey SDSS and the Dark Energy Survey DES, come plenty of top-level research papers. They participate in Outreach with a rota of speakers visiting schools in Portsmouth and Hampshire, as well as amateur societies like the VAS. A number of papers by Dr. Tojeiro (see 'Advanced reading') cover Baryonic Oscillations, Luminous Red Galaxies, the statistics of WMAP, galaxy clustering and morphology, and the physics of supernovae - all relating to the determination of the large scale structure of the Universe. What a pleasure to have features of cosmology comprehensively and clearly explained!

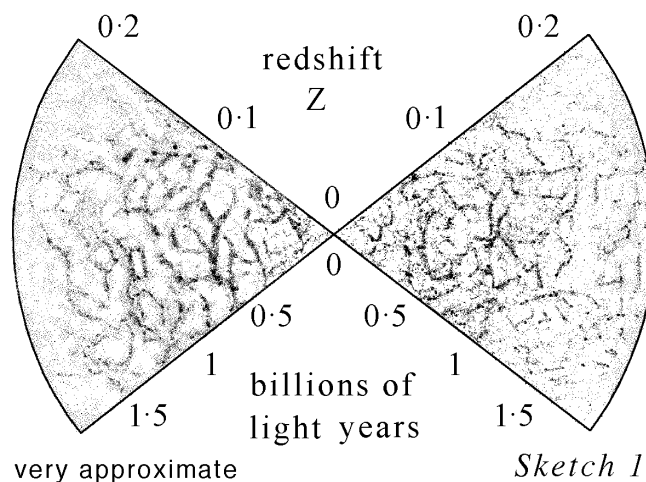
**Journey into the night sky.** The lecture began with a picture of the speaker silhouetted against a fantastic Southern sky of bright stars but "there's a lot more to the Universe than just these". The Milky Way is similar to the Andromeda galaxy, our Sun is some two-thirds of the visible way out from the centre. The Sun is a very average star - nothing special. Our galaxy, like billions of others, contains hundreds of billions of stars so it isn't special either. A movie took us on a journey towards Orion - at first the dots in the sky were stars, but as they streaked behind us and we left the Milky Way, these dots gave way to fresh dots enlarging into galaxies. The journey ended in a place far too hot to venture further - the intense heat and light within a star cluster.

**Sloan Digital Sky Survey.** SDSS began in 2000, using the 2.5m wide-angle telescope at the Apache Point Observatory, New Mexico, obtaining photometric data on 500 million objects and spectra for more than a million, across 35% of the sky. The main sample redshift (symbol 'z') is 0.1, but luminous red galaxies (LRG) were studied as far as  $z=0.7$  and quasars to  $z=5$ . In an expanding universe,  $z$  is proportional to range, related by the Hubble constant.

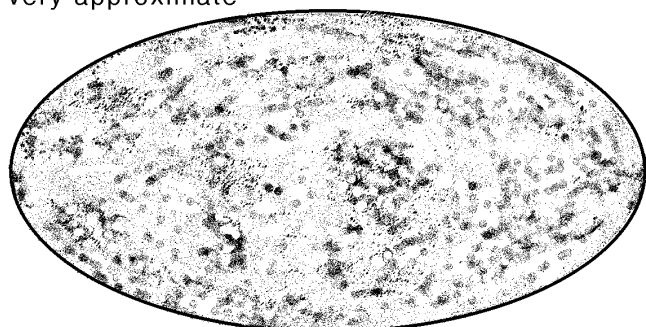
**2dF survey at the AAO** is a similar survey at the Anglo-Australian Observatory, where 400 spectra of objects can be obtained simultaneously within the two-degree field (hence '2dF').

Interesting instrumental methods were briefly described, taking five years to capture data from 1.5 million galaxies using a library of 45 aluminium plates

containing holes drilled to correspond with galactic images, with an optical fibre placed in each hole leading to a spectrometer. The AAO uses robotics to place optical fibres into the galactic image positions. (Google "arxiv 1101.1529" for more details.)



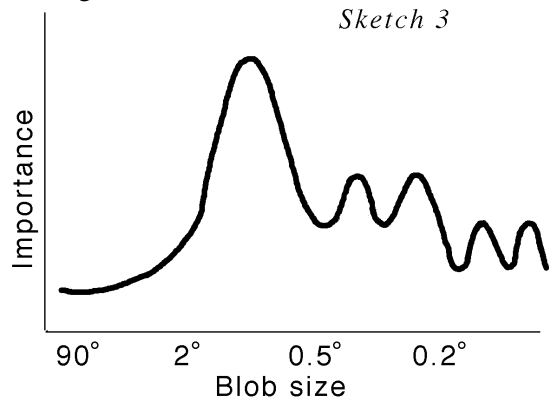
Data for structure of the universe in the north and south Galactic polar cap directions (Coma Berenices and Sculptor respectively) reveal a filamentous structure of galaxies with voids between them - see *Sketch 1*. Within one of these fan-shaped slices, the densely packed 'Sloan Great Wall' of galaxies was named.



**What have we learnt?** Radiation dominated the early dense Universe, when it was so hot that atoms couldn't exist. It was an electron plasma, like the interior of stars, a primordial soup with photons unable to travel far in straight lines, bouncing around within its opacity. It was hotter in places, but as it expanded and cooled, neutral atoms of transparent hydrogen and helium assembled, absorbing the free electrons, allowing the radiation to travel very long distances in every direction. 'Re-ionization' of the hydrogen and helium was caused by light from the first stars and quasars. Now much cooler, the radiation, which has mass via  $e=mc^2$ , makes a very small mass fraction of the 13.8 billion-year old universe. It now forms the 'cosmic microwave background', the CMB, see *Sketch 2*.

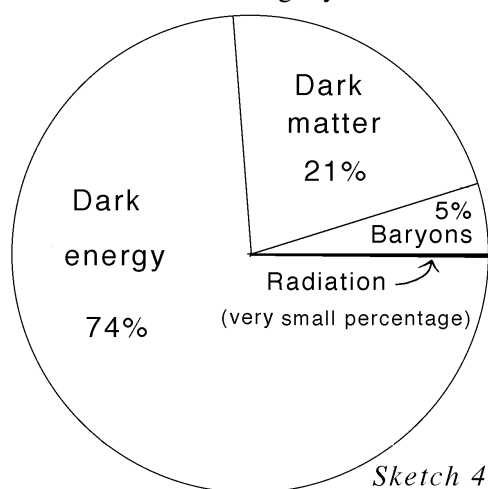
Several such maps were shown. The first, of the 1970s, was a uniform blue, like a bird's egg, the ripples in the

CMB hadn't been seen. But maps improve - illustrated by centuries old maps of Britain, compared with a satellite image of a snow-covered Britain with a clear outline, through which the lecturer toiled from Glasgow to Portsmouth. Likewise the 'blue bird's egg' map now contains speckles forming 'blobs'. The blobs have various preferred angular sizes, see *Sketch 3*.



These blobs provide clues to how the universe evolved. In the early opaque universe, the plethora of photons with their radiation pressure, pushed the baryons apart whilst gravitation pulled the baryons together. This made a springy medium through which longitudinal sound waves, with huge wavelengths, travelled around like the random waves on the sea, called 'baryonic oscillations'. As the universe cooled and atoms formed from the plasma, the universe became more transparent, and the radiation became less intense so the universe lost its springiness. This left a structure of frozen waves of density fluctuations 'decoupled' from the photons. But with the universal expansion, matter plus dark matter formed and fell into 'gravitational wells', condensing at regions of higher density, eventually making galaxies.

Computer simulations of this process give filamentous galactic structures, making blobs which tally with the baryonic oscillations, giving an average spacing between galaxies of about 500 million light years.



The concept of dark matter was illustrated using two bottles - it was obvious that one contained water because

water bends light. Dark matter also bends light because of its gravitation. Pictures of Abell clusters of galaxies show 'Einstein rings', where matter bends space. But if the visible matter is totted up, there is nowhere near enough to account for all the bending - so there must be a lot of dark matter out there, see the pie-chart, *Sketch 4*. Dark energy is a concept arising from the observed accelerating expansion of the Universe, earning Perlmutter, Schmitt, and Riess, the 2011 Nobel prize for physics, but nobody knows what dark energy is.

**Do the galaxies move around?** Yes, a movie simulated a pair of galaxies drawing each other into wisps and swirls, dark matter playing a role in the dynamics. (try "galaxy collisions" on Google).

#### Upcoming:

- **Planck Surveyor Probe** - details of the anisotropy and polarization of the CMB are due this March.
- **Euclid ESA Spacecraft**, launching in 2020, using a 1.2m Korsch telescope (3 mirrors, wide field, little stray light in the flat image plane, uniform area scale) to map the large scale distribution of dark matter, constrain dark energy properties using visible CCD imaging, as well as infrared spectrometry and photometry.
- **The Dark Energy Survey, DES**. The four-ton DECam camera will be installed at the Victor M. Blanco Telescope in Chile. It was a design challenge since silicon is transparent to infrared - important for studying distant sources out to  $z=1$ , using liquid nitrogen to cool the CCD system. Covering 5000 square degrees of southern sky. International groups will be researching strong and weak lensing, clusters, large scale structure, supernovae, galaxy evolution, simulations, strategy, calibration, to find out more about the growth rate of dark matter halos, galaxies, and why universal expansion is accelerating.
- **Square Kilometre Array, SKA**, its HQ at Jodrell Bank, will use three kinds of antenna, from dipoles to dishes, located at radio-quiet sites in Australia, New Zealand, and Africa, tuning from 70MHz to 30GHz. This global mission starts in 2019, using aperture synthesis and the 21cm hydrogen line to map the first structures in the Universe, giving information on general relativity, galaxies, dark matter, dark energy, the re-ionization epoch, cosmic magnetism, amino-acids and maybe ETI!
- **Baryonic Oscillation Spectroscopy Survey BOSS**. Ongoing research of 10,000 square degrees of sky, in 27 institutions in 9 countries, including the ICG, to determine the absolute cosmic distance

scale to a precision of near 1%, putting tight constraints on dark energy. Latest news [*Physics Today* January 2013 pp18-19] is that spectra for 48,000 quasars, with hydrogen absorbing light at various redshifted frequencies along the line of sight, indicate that the cosmic expansion switched from slowing down in the matter-dominated era, to speeding up in the dark-energy dominated era, about 7 billion years ago. See <http://sdss3.org/add/dr9/> for the latest data release.

- **Direct detection of dark matter.** Mention was made of the various projects attempting to detect weakly interacting massive particles, WIMPS.

Other projects associated with hydrogen mapping and early galaxies are: the **Giant Metre-Wave Radio Telescope** in India, the **Murchison Widefield Array**, the **Precision Array to Probe Epoch of Reionization** in Western Australia, and the **Low Frequency Array** in Europe.

**The Discussion** elucidated on matters such as radiation from the Milky Way and radio galaxies, with plenty of questions and answers, eg:-

*Q* How is 'blob importance' measured?  
*A* A combination of frequency and temperature.

*Q* With M31 heading towards us, is there any sign of mixing at the edges changing the laws of physics here?

*A* There is research into modifying gravitation theory, so dark matter isn't required...  
 ...Yes, the shapes of the constellations gradually change on very long time scales...  
 ...Dark energy is really a process rather than a fluid suggested by the pie-chart.

**Advanced reading:** go to Google, enter "Google scholar advanced search", enter R Tojeiro in the author box, tick astronomy in the subject box. A list of many papers will be found, downloadable in pdf from arXiv.

**Tutorials for schoolchildren,** see 'SkyServer' also catering for amateurs and professionals.

**A Note on 'Square Degrees':** The Moon appears  $0.5^\circ$  in diameter so its radius is  $0.25^\circ$ . Hence  $\pi r^2$ , gives its area close to 0.2 or  $1/5$  of a square degree. So five full Moon areas is one square degree. Similarly, please check for yourself that to fill a hemisphere of sky requires the area of 100,000 full moons, and a full sphere covers slightly more than forty thousand square degrees. (Mean range to Moon is 384401 km, mean radius of Moon is 1738 km, surface area of sphere is  $4\pi r^2$ )

*Dr. Guy Moore*

## Curiosity rover to ingest drill sample soon

Nasa's Curiosity Mars rover has still to ingest the rock sample it picked up a week ago.

John Grotzinger, the mission's chief scientist, says he expects this to happen very shortly.

The robot, which is investigating a deep crater on the planet, drilled into what appears to be a mudstone.

Some of the grey powder produced in the process should now be sitting in the stem of the tool, and must be moved to the onboard labs for analysis.

"We have to first confirm that the powder has moved up the drill stem," Prof Grotzinger told BBC News.

"From there, it will go into something called the drill assembly, which is about as big as a hockey puck. That's where the sample gets portioned before going through a set of tubes that takes it to some sieves."

Only particles measuring 150 microns (millionths of a metre) across, or less, will be sent to the two big labs in the belly of the rover - Chemin and Sam.

They will describe the mineralogical make-up of the mudstone and try to identify any interesting carbon chemistry that might be present.

<http://bbc.co.uk/news/science-environment-21482599>

## Island Planetarium @ Fort Victoria

The Island's Telescope Professionals

New Celestron & Meade Scopes and  
Accessories.

Other makes also available, just ask!

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Members

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and we'll call you back.

[enquiry@islandastronomy.co.uk](mailto:enquiry@islandastronomy.co.uk)

## Education Projects

At a recent Committee Meeting we decided to start a project to produce:

- A set of modular slide presentations for beginners
- Arrange equipment demonstrations
- Document some activities for children

## Modular Slideshows



The idea is to have about twenty, 5-10 minute shows which can be used by almost any member, in any combination, and aiming to cover many basic subjects in a short and entertaining way.

Work has started and so far the style of the slides has been decided (well, pretty much!) and several “test” modules have been produced.

Of course this needs a lot of input and we’d love to get as many completed sooner rather than later. Rebecca Mitchelmore has done a lot of the preliminary work and we have outlines for:

1. Getting started with binoculars and charts
2. Star hopping
3. Light
4. How the sky moves
5. What will you be able to see
6. Specific visible objects
7. How to look
8. Which telescope?
9. Planning an observing session
10. Eyepieces
11. Imaging
12. When it rains
13. Social activities
14. Look after yourself and equipment
15. Space and Exploration
16. Other types of observing
17. DIY

## Demonstrations

These need to be documented so they can be used by almost any member and will include:

- Different mounts
- Assembling and aligning an equatorial mount
- Using a planisphere
- Using Stellarium
- Collimation
- Using “Apps”
- Attaching a camera to your telescope
- Adapting webcams

## Activities

These need to be documented so they can be used by almost any member and will include:

- Making a planisphere
- Scale modelling the solar system on the field
- Demonstration of light gathering
- Look through a telescope in daylight
- Which is bigger? - game
- Identifying objects - quiz
- Quiz night for adults - dome visit etc
- Create wallcharts to help with star hopping

## Help!

This is an ambitious project but a very useful one as it will help us better structure both clear and cloudy nights at the observatory

We now need help to produce the final slides and documents. If you can spare a little time and have access to a computer and email we’d love to hear from you.

We are also investigating our options regarding CRB and STEM (Science, Technology, Engineering and Maths), again, if you would like to get involved:

***Please contact any Committee Member***



# Stellarium Cheat Sheet

## What is Stellarium?

Stellarium is an open source desktop planetarium for Linux/Unix, Windows and MacOSX. It renders the skies in realtime, which means the skies will look exactly like what you see with your eyes, binoculars, or a small telescope. Stellarium is very simple to use, which is one of its biggest advantages: it can easily be used by beginners.

## Is Stellarium free?

Yes! Stellarium is open source software. Anyone has the right to download and use the software for free, to distribute it without modifying to other people, or modify the source code, all of this under the terms of the GNU General Public License (GPL).

## Where can I download Stellarium?

Visit <http://www.stellarium.org> and follow the instructions for your computer type.

Don't forget to download the complete User Guide as well as it is not included with the installation files.

Keys	Effect
<b>Display Options:</b>	
.	Equator line
A	Atmosphere
,	Ecliptic line
;	Meridian line
B	Constellation boundaries
C	Constellation lines
E	Equatorial grid
F	Fog
G	Ground
N	Nebulas
O	Planet orbits
P	Planet labels
Q	Cardinal points
R	Constellation art
S	Stars
V	Constellation labels
Z	Azimuthal grid

Keys	Effect
F11	Full-screen mode
Alt+S	Stars labels
Ctrl+N	Night vision mode
Shift+T	Planet trails
<b>Movement and Selection:</b>	
/	Zoom in on selected object
T	Track object
\	Zoom out
Space	Center on selected object
Ctrl+G	Set home planet to selected planet
Left click	Select object
Right click	Clear selection
Page Up/Down	Zoom in/out
CTRL + Up/Down	Zoom in/out
Arrow keys & left mouse drag	Pan view around the sky
<b>Windows:</b>	
F1	Help window
F2	Configuration window
F3, Ctrl+F	Search window
F4	Sky and viewing options window
F5	Date/time window
F6	Location window
F12	Script console window
<b>Miscellaneous:</b>	
Ctrl+C	Copy selected object information to clipboard
Ctrl+H	Go to home
Ctrl+M	Switch between equatorial and azimuthal mount
Ctrl+Q	Quit
Ctrl+S	Save screenshot
Ctrl+T	Toggle visibility of GUI

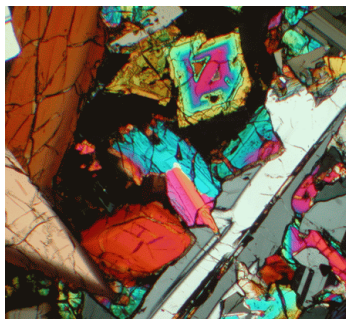
This is not the full list of controls but it shows the most useful ones for ordinary users.

For full help press the Function Key "F1".

## THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

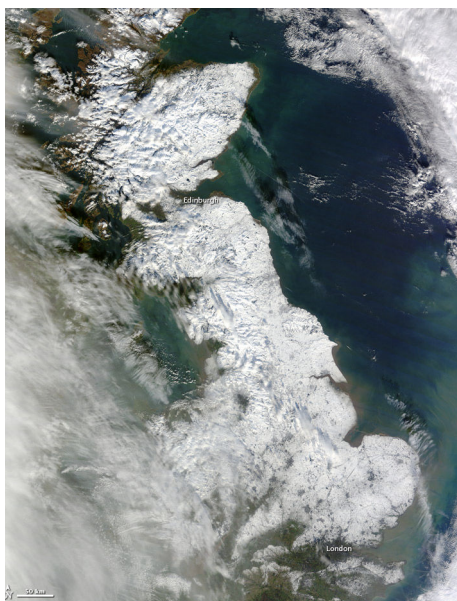
### Meteoritical Bulletin Database



With all the recent talk about meteorites I did some searching to identify any local (UK) “strikes” and came across the Meteoritical Society at <http://meteoriticalsociety.org/>.

As well as some quite beautiful photographs there is a section enabling location searches for anywhere on earth - <http://www.lpi.usra.edu/meteor/metbull.php>. I selected “Search for: Places” and entered “United Kingdom”, the result was 44 records all shown with links for more exploring - worth a visit.

### NASA - Landsat



“Landsat imagery courtesy of NASA Goddard Space Flight Center and U.S. Geological Survey”

*The Landsat program offers the longest continuous global record of the Earth's surface; it continues to deliver visually stunning and scientifically valuable images of our planet. This short video highlights Landsat's many benefits to society.*

In 1975, NASA Administrator Dr. James Fletcher predicted that if one space age development would save the world, it would be Landsat and its successor satellites. Since the early 1970s, Landsat has continuously and consistently archived images of Earth; this unparalleled data archive gives scientist the ability to assess changes in Earth's landscape.

For 39 years, the Landsat program has collected spectral information from Earth's surface, creating a historical archive unmatched in quality, detail, coverage, and length.

“It was the granddaddy of them all, as far as starting the trend of repetitive, calibrated observations of the Earth at a spatial resolution where one can detect man's interaction with the environment,” Dr. Darrel Williams, the Landsat 7 Project Scientist, states about Landsat.

Landsat sensors have a moderate spatial-resolution. You cannot see individual houses on a Landsat image, but you can see large man-made objects such as highways. This is an important spatial resolution because it is coarse enough for global coverage, yet detailed enough to characterize human-scale processes such as urban growth.

*Ton's of info and images and all in the Public Domain.*

<http://landsat.gsfc.nasa.gov/>

### Observatory

For your own safety, when visiting the VAS observatory, please bring a torch. Also, please make sure you close and lock the car park gate if you are the last to leave - if you need the combination to the lock, please contact a member of the committee.

### Articles Needed

New Zenith needs letters, articles or pictures related to all aspects of astronomy. Contributions to the Editor please at the email or postal address on the front page.

*“The Universe is not a collection of objects, but is an inseparable web of vibrating energy patterns in which no one component has reality independently from the entirety. Included in the entirety is the observer.”*

**Paul Davies**

### Quotations

*“I've never owned a telescope, but it's something I'm thinking of looking into”*

**George Carlin**

*“I have not failed 10,000 times. I have successfully found 10,000 ways that will not work”*

**T.A. Edison**