New Zenith

The Monthly Magazine of the Vectis Astronomical Society

Vol 16 Issue 6 July 2008

Society News

From the Chairman

With the glorious days of sunshine we have had (interspersed with the miserable ones) I was sad to hear about the end of the solar mission Ulysses. This joint ESA/ NASA spacecraft has been orbiting the Sun for over 17 years, and has studied the Sun and its effect on the surrounding space for almost four times its expected lifespan. It will cease to function on July 1st as its onboard generators no longer produce enough power. Ulysses gave us, amongst many other things, the first detailed measurements of the solar wind from the Sun's polar regions at solar minimum and solar maximum, the discovery that the magnetic flux leaving the Sun is the same at all latitudes, and the discovery of interstellar dust in the solar system.

But as one mission ends, another begins. The Gamma-ray Large Area Space Telescope (GLAST), which was launched in June, should provide astronomers and scientists with a whole new insight into the high-energy world of space radiation. Apparently, it will be used to study how black holes can accelerate jets of gas outward at fantastic speeds and subatomic particles at energies far greater than those seen in ground-based particle accelerators. Cosmologists will also gain valuable information about the birth and early evolution of the Universe.

I haven't managed to see much in the way of stars these past few weeks, mainly due to the long summer days. However, with the refurbished telescope down at the observatory, we did get a great view of Saturn, poking through the clouds and a lovely little fuzzy blob (M57, the ring nebula in Lyra). Do come and see for yourself.

Don't forget, if you would like to stand for any of the honorary officer positions, or would consider becoming a member of the committee, please do fill in the form on page 2.

Stop Press: *I'm sure you'll all join me in congratulating John Smith as he has been made an MBE in the Queen's Birthday Honours List.*

Clear Skies!
Dr Lucy Rogers
Chairman, Vectis Astronomical Society

STOP PRESS 2
Liquid water on Mars.
Latest photo on page 7

VAS Website: www.vectis-astro.org.uk

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

The Editor New Zenith
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Sandown PO36 0JY

Tel: **01983 864303** or email: **brian@briancurd.com**

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

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Contents

*VAS 2008 - Meeting Programme**

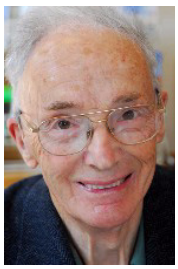
Jul 25th	***TBA** - Greg Smye-Rumsby*
Aug 22nd	Astrophotography - *Philip Perkins*
Sep 26th	Colours in the Sky, Oddball Theories *Members Night*
Oct 24th	Beyond the Eyepiece *-Peter Burgess*
Nov 28th	Historic Telescopes of Cambridge University - *Mark Hurn*
** Correct at time of publication*	

Observatory Keys

The locks on the observatory have been changed. Old keys can now be exchanged for new - contact me for details.

Roger Hayward
Observatory Director

Queen Honours Island Stargazer



JOHN Wilson Smith has been made an MBE in the Queen's Birthday Honours List.

Mr Smith, from Forest Road, Winford, receives the honour for voluntary service to the Newchurch community.

The IW Observatory, at Newchurch, was conceived by Mr Smith, who raised the funding for the original project. He remains a keen supporter of the Vectis Astronomical Society.

By Richard Wright - Saturday, June 14, 2008
From the IOW County Press

A Date for your Diary

To celebrate the 10th anniversary of the Observatory we have booked the nearby pavillion for the afternoon of Sunday 28th September. Final arrangements are being made right now so please keep an eye on the website.

New Library Addition

Our Chairman, Dr Lucy Rogers has kindly donated a signed copyof her recently published book "It's ONLY Rocket Science" - *See "It's ONLY Rocket Science" on page 5.*

VAS - Officers and Committee

This list is published as an aid to anyone thinking of standing for election at the 2008 AGM and shows the positions and current incumbents.

- *Chairman* - Lucy Rogers
- *Secretary* - Sue Curd
- *Treasurer* - Graham Osborne
- *Other Committee Members* - John Langley, Roger Hayward, Bert Paice, Bert Buckett, Bill Johnston, Roger Young, Tony Plucknett, Brian Curd, Richard Flux.

If you are interested in any of the above posts or would like to nominate somebody else, please complete the form below and send it to:

The Secretary
Vectis Astronomical Society
35 Forest Road
Winford
Sandown
Isle of Wight
PO36 0JY

Nomination Form

Name: .....
Address:.....
.....
.....
.....
Telephone: .....
Email:.....
I would like to nominate: .....
For the post of:.....

Signature: .....
Date: .....

Please Note:

- Nominations must be received at least 7 days before the AGM on August 22nd 2008.
- When nominating anyone other than yourself, please check they are willing to accept a position.
- The current Officers and Committee members have agreed to stand for election in 2008.

Of course, in addition to these positions, there are many others who help with the day-to-day operation of your Society. If you feel you could spare a few hours each month to help, please contact a member of the Committee.

This Month's Night Sky

Moon Phases

New	1st Qtr	Full	Last Qtr
3rd	10th	18th	h

The Earth's orbit is noticeably elliptical; in January the Earth-Sun distance was 0.983 Astronomical Units (AU) whilst on the 4th of July this distance is 1.0167 AU which shows an ellipticity of 0.967 (1.00 is a perfect circle).

Planets

There is a very poor morning apparition of **MERCURY** around the middle of the month which sees a peak altitude of only 2.5° between the 9th and 14th approximately 40 minutes before sunrise in the brightening north east sky. Background stars of Gemini accompany Mercury. Superior conjunction is quickly reached by the 29th.

VENUS is still unfavourable as it creeps away from last months conjunction with the Sun.

MARS sets at 22:30 by the end of the month - only 45 minutes or so after sunset and is now faint and unfavourable.

JUPITER is at opposition on the 9th and is excellently placed, although fairly low down due south at around midnight. Apparent diameter is 47.5" which is about the best it gets. It's worth taking some time at a telescope's eyepiece and returning again a couple of hours later to see how quickly the planet's swift rotation renews the detail seen on the disk.

SATURN is also an unfavourable planet as it heads towards the Sun's evening twilight. On the 10th at 17h Saturn lies just 38' away from Mars but, as explained above Mars is a very poor object right now!

URANUS and **NEPTUNE** are now close to their respective oppositions. Use the small star map opposite to identify the background stars of Capricornus and Aquarius. Uranus is bright enough to be visible in binoculars but Neptune is a harder object to locate, needing a telescope and dark skies to make identification easier.

Meteors

Three showers peak this month:

On the 21st the alpha **Cygnids** reach an unfavourable maximum. Expect rates of around 5 per hour.

The 8th, 15th & 26th sees fairly favourable, unfavourable and fairly favourable maxima respectively of the **Capricornid** stream.

On the 28th the delta **Aquarids** reach a favourable 1st peak with a predicted rate of around 20 per hour.

Occultations

18th July:

00:29 Disappearance of 51 Sagittarii

00:39 Disappearance of 52 Sagittarii

01:37 Re-appearance of 51 Sagittarii

01:57 Re-appearance of 52 Sagittarii

Deep Sky

M24 Sagittarius Star Cloud
R.A. 18h 16m Dec -18° 43'

This object is big! Eight times the area of the full moon. It is an object full of objects, open clusters, dark nebulae and even a planetary nebula. Use any optical aid you have, binoculars for wide field views and a telescope for closer examination. This is one of, if not the best star fields in the galaxy; don't miss it.

M17 The Omega Nebula
R.A. 18h 21m Dec -16° 11' mag 7.0

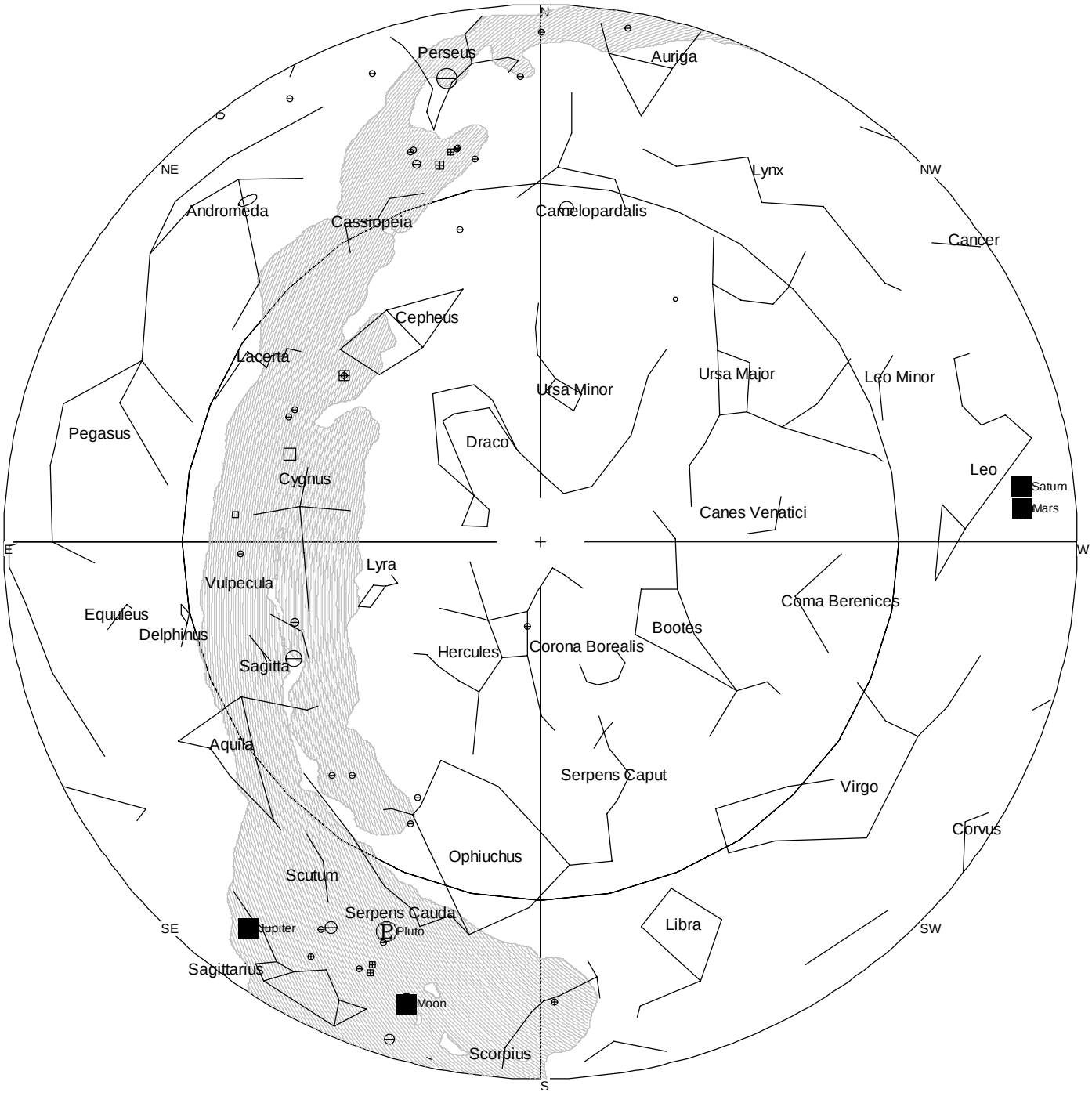
If it were not for the Orion Nebula this would be the great show piece of the sky. Binoculars show the curved shape of this giant glowing gas cloud and stellar nursery. Some times called The Swan nebula, the swan swimming upside down through the Milky Way becomes more obvious through a small telescope.

M11 The Wild Duck Cluster
R.A. 18h 51m Dec -6° 16' mag 7.0

Easily seen in binoculars as a fuzzy patch in the Scutum Star clouds, this cluster gets its name from the V shape formed by two long chains of stars on its northern edge. They are supposed to represent the V formation of a flock of wild ducks flying across the Milky Way.

Peter Burgess

July's Sky

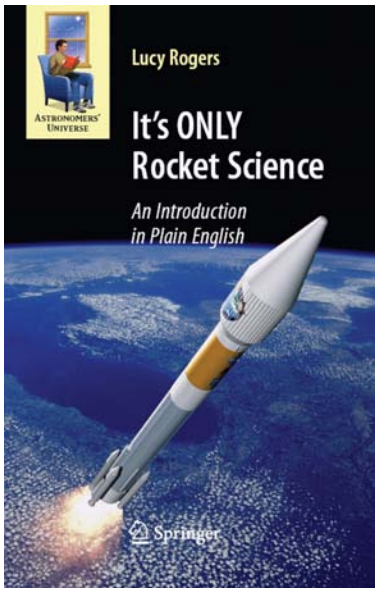


Messier 11 (M11, NGC 6705) contains an estimated 2900 stars, about 500 of which are brighter than mag 14. An observer at the center of M11 would see several hundred first magnitude stars!

The age of the Wild Duck cluster has been recently calculated at 250 million years. It is receding at 22 km/sec.

M11 was discovered by the German astronomer Gottfried Kirch of the Berlin observatory in 1681. It was apparently first resolved into stars by William Derham about 1733. Charles Messier included it in his catalog on May 30, 1764.

It's ONLY Rocket Science



It's not rocket science, Hargreaves, the maths teacher would growl, as I grappled with my algebra – a struggle that normally terminated in exasperation for both teacher and pupil. He was right, of course, but to me mathematics might as well have been the final frontier; one that I was destined never to cross.

So I approached Dr Lucy Rogers' new book on, erm, rocket science with a certain level of trepidation. Would this bring back unwelcome memories of afternoons at school attempting to master quadratic equations and long division?

After all, as the author says, the science behind launching people and objects into space involves a formidable number of disciplines, including mathematics, engineering, chemistry, astronomy, physics and biology. "Rocket science" has become a byword for "difficult," up there with brain surgery in terms of the demands it places on its practitioners.

But it's IMechE member Rogers' aim to make rocket science palatable for a general audience, and this she does with aplomb in It's Only Rocket Science: An Introduction in Plain English. If you've ever gazed up at the night sky and wondered where the atmosphere ends and space begins, or how astronauts go to the loo, or who has sovereign rights to the heavens (answer: no one), there is likely to be much within it to interest you.

Rockets, it transpires, are an ancient invention, with the Chinese making the first examples in around AD 600. They found favour as weapons of war, and were used by the British against the US in the 1800s, inspiring Francis Scott Key to write of the "rockets' red glare" in the poem that would go on to become the Star Spangled Banner.

During the Second World War, rockets were still being used as weapons, and the Nazi-developed A4 – later to be renamed V2 – became the first manmade object to be launched into space, reaching a height of 189km in 1942.

V2 rockets, the first long-range ballistic missiles, were made under atrocious conditions that killed more workers than enemy civilians, but the expertise required to develop them transferred readily to the space race following the war.

Rockets and space travel developed at an incendiary pace during the years of the Cold War, and it was then that many of the key principles of rocket science were developed, such as multi-stage systems – a technique that can be traced back as far as the 16th century innovations of a German firework manufacturer, Johann Schmidlap – and spin stabilisation, which is still used on some craft.

It was during this era that we learned to develop the systems that would allow humans to live and work in space. Since the flight of the first astronaut, Yuri Gagarin, in 1961, there have been more than 200 manned space missions, and a massive variety of satellites and probes has been sent into orbit.

As well as a compelling review of the history of spaceflight, Rogers' book provides a readily comprehensible study of some of the key concepts that underpin that dreaded old rocket science.

It should provide a welcome read for anyone looking to enhance their understanding of an area previously thought of as the preserve of the specialist.

It's ONLY Rocket Science
An Introduction in Plain English

Publisher *Springer New York*
ISBN *978-0-387-75377-5 (Print)*
978-0-387-75378-2 (Online)

Even rocket science can be made to seem simple, as a new book on the history of space flight proves, writes *Ben Hargreaves*

Available direct from Lucy - £19.00

Time's Arrows - *and how Nature can fire them again and again!*

Time has something to do with humans - exactly what has puzzled scientists for many years. They like to be objective, yet in some way time is related to our situation in the Universe. 'Objective' means, for example, tying brass weights to a metre ruler with string and verifying the law of levers, with the experimenter in a personally very detached position. But with the nature of time, the scientist gets dragged right into the issues themselves.

Why are molecules so small? - is the same question as - why are we so big? Within this relationship between us and molecules, strange secrets lie to do with time. Molecules are like particles, or on a bigger scale, like billiard balls. Watch a film of two snooker balls colliding, and then show the film backwards and the collision still makes sense. That's because the laws of mechanics are reversible, so a film of a pendulum swinging also looks okay shown in reverse. But films of most everyday events shown in reverse, like smoke coming out of a chimney or a swimmer diving, look ridiculous. Why is there a direction, or an 'arrow' of time'?

Instead of film, we can have fun here with static pictures. Fig.1 pictures an ice-skater (*yes it's me!*) on my way to a gold medal in the Isle of Wight Figure Skating Championships at Planet Ice in March and a Spirit of Skating Award (round of applause). You might think I'm travelling forwards in the picture - I *am* travelling forwards *in time* - but this is a backward spiral. Time's arrow goes from right to left here, but since mechanics is reversible, then the other direction, a forward spiral, is equally feasible. Flipping the picture horizontally causes no mechanical problems, except for blood circulation, and then mechanical time and biological time run in opposite directions, at the same time! - is there a *language problem* here? My homemade concertina music might sound better in reverse, but the applause, just as good, thank you!

Some people suggest that time might boil down to a pointless language problem. I once went to a lecture by the late Professor Ilya Prigogine (Nobel laureate, born in Russia, he led a research team in Brussels). He did a great deal of thinking about time. "Sometimes time takes the appearance of one of those strange mysteries," he said, "where the reader tries to work out who committed the crime, but by a particular skill of the writer, it turns out to be you, the reader! Could we, human beings, likewise be responsible for time?" But then he brought us down to earth with, "in that case, how to explain evolution, the whole of evolution?"" He wrote several books on the subject (try his: *Order out of Chaos*, with Isabelle Stengers, Bantam, London,1984.) He found himself at odds with other scientists. Very familiar with molecular fluctuations, he commented "it would be a very strange thing for a fluctuation to persist for 15 billion years, creating the Universe from nothing more 'han a tiny quantum-mechanical fluctuation" (from 'Soul: The Evolving Soul.' BBC2, 14 April 1992, in an interview with Dr. Anthony Clare). He said his job as a physicist was not to invent a universe, but to try to describe it.

But now let's now see what happened to the DIY enthusiast in Fig.2. He got stuck in an 'irreversible' situation. The logic, "you got up there, so you must be able to get down" - does not follow. He cannot retrace his movements and go into reverse, but why not? He is made of molecules and the laws of mechanics operate in reverse, so how can he get stuck? How can cats get stuck in trees?

Fig.2

Having worked on roofs, often alone, I needed to avoid getting trapped myself. Thinking back over thermodynamics, a criterion for whether you're likely to get stuck became apparent. Thermodynamics is full of 'quasi-static gas expansions'. If things happen quickly, mathematics cannot cope and the processes become 'irreversible'. But if gas expansions are done slowly with no swirl or turbulence, starting from an equilibrium state, finishing with an equilibrium state, with all intervening

states very close to equilibrium, then simple maths works. At any stage, the process can be stopped and put into reverse. I decided when climbing on roofs, that if by moving *very slowly* you can get to a new position, then you can always get back by going in reverse. If, however, you need to make a sudden movement, like a jump, grab, tug, or a heave, this may trap you in an 'irreversible' predicament, requiring a different means of escape.

The science of irreversibility is highly complex. It deals with phenomena such as the formation of structure. Science is a vast subject, and so the drive to take short cuts, if you can see any, is very attractive. If you don't take advantage of short cuts, you could spend a lifetime making calculations, getting lost in detail. Here I find a big pay-off comes from the logic of engineering thermodynamics as opposed to physics.

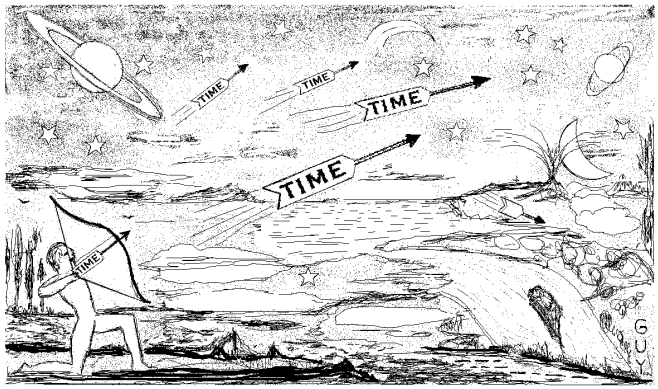
Physicists deal more in atomic details, telling us that atoms tend towards more probable states. I find this paradoxical. If you shake a bottle of water, you might think that the water is moving randomly, but physicists tell us that when the water has settled down to its most probable state, that this is even more random. Yet this state is static equilibrium, in which the haphazard eddy currents have dissipated. The shaken bottle of water amounts to being 'improbable' on a molecular basis - physicists call this 'structure'! The DIY man with his legs dangling over a gable has many more ways of moving his feet in free space, than getting them back onto the ladder. Ho! ho! - sounds funny, but this is the logic that applies when physicists believe they can see 'structure' in the Universe! A uniform spread of galaxies is supposed to be random, whereas a non-uniform dispersion possesses what they call 'structure' in the same way that water shaken in a bottle possesses 'structure'. My brother and I find this logic, coming from physics, rather curious!

The next pay-off when taking shortcuts, is to shift to philosophy, the king of all subjects (well - bits of it!), yet dependent on all of them. The probability arguments of physicists and the logic of engineers with their entropy principle, have emerged from their observational relationship with the finite quantities of matter they study in their laboratories and workshops. The logic of their arguments suggests that we need to explain the large order that apparently exists in the Universe to start with, or the formation of structure as the Universe develops towards increasingly probable states following time's arrow. From a philosophical viewpoint, however, these arguments depend upon a questionable hidden assumption, discussed in 'Curtains for Cosmological Entropy?' *New Zenith* April 2008. Pointing this out constitutes throwing a heavy spanner, not into the realms of practicality, but into the attempted application of practical arguments to our vast Universe. No doubt the practical arguments can be extrapolated a little way into the heavens, but beyond a certain range, such arguments become increasingly questionable and must eventually expire. They expire because these arguments require the ability to define isolated systems of matter that can endure for ever, but if that cannot be done, then the arguments must vaporize.

Scientists have a special word for losing track of the ability to describe things - 'uncertainty'. When things are uncertain, then what rules apply? The logic presented in the 'Curtains for cosmological entropy?' article is that violent cosmological processes constitute 'fully wound up clock springs'. Since matter gets dragged into black holes, and we cannot see what happens inside them, the physical phenomena inside must be regarded as 'uncertain'. If they later explode, later by our definitions, then they can shake up the local equilibrium and create 'structure' in the physicists' sense discussed above. Effectively, in such processes, the clocks have been reset to new beginnings. Within the hidden processes themselves, however, time has not only effectively run backwards, it really has run backwards according to the conventional, sacrosanct, rising entropy principle, when used as a yardstick. Nature could be launching many arrows of time in this way, in various places in the Universe, perhaps in the middles of galaxies or in distant quasars!

Thanks to my ice-skating coach, Terri Fleming!

Dr. Guy Moore



Liquid water found on Mars!!

Uranus and Neptune
May Monthly Meeting Report

Dr. Mike Leggett - Milton Keynes AS

Uranus was officially discovered by William Herschel on 13th March 1781. However, there had been at lest 24 recorded observations of the planet before then but it had not been recognised as a planet by those astronomers. For instance John Flamsteed recorded Uranus as a star in Taurus on 13th December 1690. Uranus moves slowly against the background stars so it is difficult to identify as a planet. Herschel initially reported it as a comet and only recognised it to be a planet in May of 1781.

A number of names were suggested for the new planet. Herschel suggested Georgium Sidus after George III in an attempt to curry favour with the king. Other names included Hershellium, Hypercronicus and Neptune. However, the name Uranus was put forward by Johann Bode and received general acceptance.

Similarly Neptune had been observed before discovery. Galileo saw the planet on 28th December 1612 without recognising it for what it was. The presence of Neptune was predicted before its discovery due to perturbations in Uranus' orbit. These deviations were variously attributed to another planet, 'cosmic fluid', a satellite of Uranus, a comet and variations in gravity.

An initial search by Bessell and Fleming in 1840 was unsuccessful. Then in 1845 John Couch Adams in England predicted the orbit by mathematical calculations based on the deviations in Uranus' orbit. Adams tried unsuccessfully to persuade George Airy, the Astronomer Royal at Greenwich to search for the planet. In June 1846 Urbain Jean Joseph Le Verrier published similar calculations but had as much success at Paris observatory as Adams had at Greenwich. Le Verrier asked for and received orbital data from Airy and Airy recognised the similarity in Adams and Le Verriers work. He asked James Challis to search for the planet and although Challis did observe Neptune in August 1846 he failed to recognise it as a planet.

Finally on 18th September 1846 Le Verrier wrote to Johann Galle at Berlin and on 23rd September the new planet was identified. A row broke out as to who the discovery belonged to but eventually Adams and Le Verrier were recognised as independent co-discoverers. James Challis resigned over the affair and is now unfairly remembered as the man who didn't find Neptune.

Names proposed for the new planet included Janus (by Galle), Neptune (Le Verrier), Le Verrier and Oceanus (by Challis).

Uranus and Neptune are gas giants of similar composition. They contain less Hydrogen and Helium than Jupiter and Saturn and more ices such as ammonia and methane. Our knowledge of these two planets before the space age was limited to this and some details about axial tilt and the larger moons. Uranus was known to have 5 moons and Neptune two. Neptune's moon Triton was discovered on 10th October 1896 by William Lassell and in 1944 Kuiper detected a methane atmosphere.

The Voyager 2 flyby's provided a wealth of data on both planets. Ten new satellites were discovered orbiting Uranus. The ring system that had been discovered a few years earlier was mapped in detail. Faint cloud details with a rotation period of 17 hours were recorded together with radio emissions and a magnetic field. Neptune was also found to have a ring system, six new satellites were discovered and a rotation rate of 16 hours 3 minutes recorded. Radio emissions and an inclined magnetic field similar to that of Uranus were measured and the atmospheric composition recorded as 85% Hydrogen, 13% Helium and 2% Methane.

An internal heat source means Neptune radiates 2.8x the energy received from the sun.

Reported by: Roger Young

Editor's Note:

The list of references and bibliography for this lecture is on the following page.

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Dr. Mike Leggett - Milton Keynes AS

THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

News From Around the Web

Pheonix Mars Lander

NASA's Phoenix Mars Lander began excavating a new trench, dubbed "Snow White" in a patch of Martian soil near the center of a polygonal surface feature, nicknamed "Cheshire Cat". The "dump pile" is located at the top of the trench, the side farthest away from the lander, and has been dubbed "Croquet Ground". The digging site has been named "Wonderland".

The trench is about 2 cm (.8 in) deep and 30 cm (about 12 in) long. At this early stage of digging, the Phoenix team did not expect to find any of the white material seen in the mission's first trench, now called "Dodo-Goldilocks". That trench showed white material at a depth of about 5 cm (2 in). More digging of Snow White is planned for coming sols, or Martian days.

Snow White was dug on Sol 22 (June 17, 2008) with Phoenix's Robotic Arm. This picture was acquired on the same day by the lander's Surface Stereo Imager.

Image credit: NASA/JPL-Caltech/University of Arizona/Texas A&M University/NASA Ames

http://www.nasa.gov/mission_pages/phoenix/main/index.html

Radio Telescope Spanning Four Continents

Astronomers have set up a radio telescope which spans over four continents, a feat they claim is the first in the world. Scientists have long combined observations from individual telescopes through interferometry, a process that produces the same resolution as a single dish as wide as the distance between the antennas. Now, an international team, led by Arecibo Observatory in Puerto Rico, has developed the integrated telescope. "Its size gives it ten times the resolution of the Hubble Space Telescope, allowing the array to image objects, like the bright 'afterglow' formed when a high-speed jet of matter from a gamma-ray burst slams into its surroundings, that just look like points to individual radio telescopes," according to Chris Salter of Arecibo.

In an observational run, the team found that antennas in North America, South America, Europe and Africa all pointed in the same direction. Signals were fed by fibre optics in a bid to create real-time images at a hub in the Netherlands. Previously, data from each telescope was recorded on discs and mailed to a central location. Now, data is sent via fibre optic cables to produce real-time images of celestial objects, the 'New Scientist' reported.

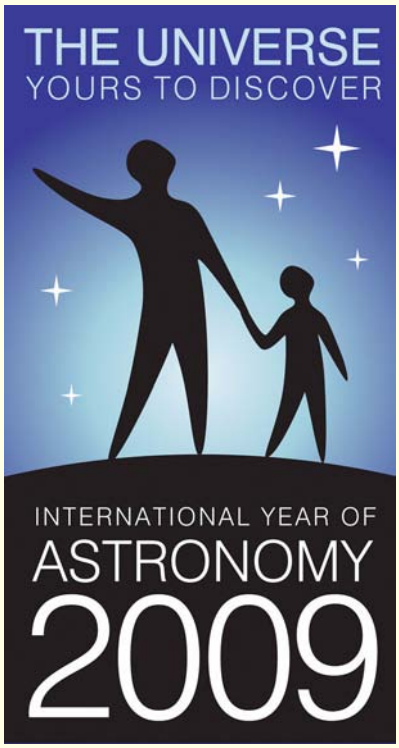
According to the astronomers, this will allow us to plan follow-up observations for rapidly changing phenomena, such as supernovae.

"Such observing plans, which can change quickly depending on what the target does, were hard to justify when the data was still in the mail. These are very expensive telescopes. They don't just give away time on the off-chance that something will happen," said Arpad Szomoru of the Joint Institute for VLBI in Dwingeloo, the Netherlands.

More info at: *http://www.jive.nl/*

2009 - International Year of Astronomy

We are arranging a year of events for 2009 - International Year of Astronomy. If you can suggest venues or can help organise events next year, please contact Brian Curd (*details on the front page*).



Observatory

For your own safety when visiting the VAS observatory, please remember to bring a torch. Also, please make sure you close the car park gate if you are the last to leave.

Articles Needed

New Zenith welcomes letters, articles or pictures related to all aspects of astronomy.
Please send contributions to the Editor at the email or postal address on the front page.