

Physics & Astronomy

FROM THE HOD (ASSOCIATE PROFESSOR ROGER REEVES)

Into the final week of term and it seems that the year is flying by very fast. Hopefully over the break I get a chance to attack the dross of paperwork - all non urgent that inhabits my floor.

Significant events happening at the present time of course involve the BSc review and the Department review for the College Plan. A portfolio of material is being assembled by each dept for the BSc review. Apparently it has been quite some time - if ever -since the BSc was reviewed on such a widespread scale. This means that there are no prior documents we can compare with.

The Dept review for the College plan was set down to begin around the 18 Sept but this is likely to be brought forward by 10 days or so. The departments that have already started are finding that they need to go away and do some thinking. I expect we will be the same and so we will start review while the earlier departments are in this introspection mode.

THIS WEEK'S SEMINAR: - 11:00AM, FRIDAY 24 AUGUST

Dr Anthony Butler

Consulting Radiologist at the Christchurch Hospital, former University of Canterbury student of the Physics and Astronomy Dept and PhD student of the Electrical Computing Engineering Dept

Bio-medical X-ray Imaging With Spectroscopic Pixel Detectors

The aim of this presentation is to review the clinical potential of spectroscopic Xray detectors. Images of surgical specimens obtained with a Medipix-2 detector will be presented. A new breed of X-ray detectors is being developed that individually processes photons interacting with a sensor. These are either known as quantum detectors, photon counting detectors, or for the more advanced systems, photon processing detectors. Many of these detectors, such as Medipix-2, allow thresholds to be selected so that only photons within a specified energy range are recorded. New detectors in development, such as Medipix-3, have multiple thresholds within each pixel. These new detectors will allow for routine use of spectroscopic X-ray systems for bio-medical imaging. The significance of spectroscopic X-ray detectors is difficult to predict but insights can be gained by examining both image reconstruction artefacts caused by beam hardening, and the current uses of dual energy techniques in biomedical imaging. Beam hardening artefact is a CT reconstruction artefact that arises due to the approximation that the spectrum of transmitted X-rays is constant regardless of the material being imaged. This artefact poses significant clinical problems in diverse areas including CT pulmonary angiography and musculoskeletal imaging around metallic implants. It is hoped that with spectroscopic detectors the artefact can be reduced, thus improving diagnostic capabilities. Dual energy angiography is a technique where an infused angiographic contrast agent is identified by its k-edge. Within bio-medical imaging iodine and gadolinium contrast are routinely used for vascular studies and tumour characterisation. Both iodine and gadolinium have k-edges within the energy range of diagnostic X-rays making them easily identifiable with spectroscopic detectors. Potential clinical applications include pre- and post-contrast CT imaging and retention of contrast in tumours such as breast cancer. Different tissues and tumours have different attenuation coefficients over a range of energies. Spectral imaging will translate to better identification and delineation of tumours compared to conventional imaging. While dual energy techniques are well established for bone diseases, for practical reasons they are rarely used elsewhere.

Despite this, spectral information is known to be of benefit for many diseases. Published examples of the use of energy information in mammography include:

- 1) lower energies provide better soft tissue contrast.
- 2) ductal carcinoma has a different attenuation spectrum than fibrous tissue.
- 3) micro-calcification can be better identified for early detection of cancer.

In conclusion, spectroscopic X-ray pixel detectors have potential for a wide range of clinical benefits.

NOTE: THERE WILL BE NO SEMINARS DURING THE SECOND SEMESTER BREAK – FROM 27 AUGUST – 8 SEPTEMBER

PHYSICS & ASTRONOMY DEPARTMENT CONFERENCE (MICHAEL ALBROW)

This year the Department Conference will be held on **Monday 3 and Tuesday 4 September** in Maths 031. This is a great opportunity for students and staff to give presentations on their research and to find out exactly what is going on in the various groups in the Department.

A full itinerary will be circulated next week with a link from our Department home page.

THE THREE AMIGOS - SEAN RYAN (BSC HONS 1985), DAVID BUCKLEY (BSC 1979, MSC 1982), STUART BARNES (BSC 1996, MSC 1998, PHD 2004)

These three Physics and Astronomy graduates were recently at the University of Durham, where they were involved in the initial meeting to begin the construction of the University of Canterbury designed Southern African Large Telescope (SALT) high resolution spectrograph (affectionately called, SALT HRS).

Their connection: Stuart (now at The University of Texas) was the optical designer for SALT HRS, David is overseeing the construction on behalf of the SALT Board, as the SALT Project Scientist and Sean (now at the University of Hertfordshire) is the new SALT HRS Project Scientist, ensuring that the best science is achieved with this instrument. We wish them, and of course the construction team at the University of Durham, all the very best in this phase of this project and we look forward to using SALT HRS on SALT in the next couple of years.



LUNAR ECLIPSE - KAREN POLLARD (INFORMATION TAKEN FROM THE RASNZ WEBSITE)

[HTTP://WWW.RASNZ.ORG.NZ](http://www.rasnz.org.nz). PLEASE GO TO THE WEB LINK FOR MORE DETAILS AND SKY CHARTS.)

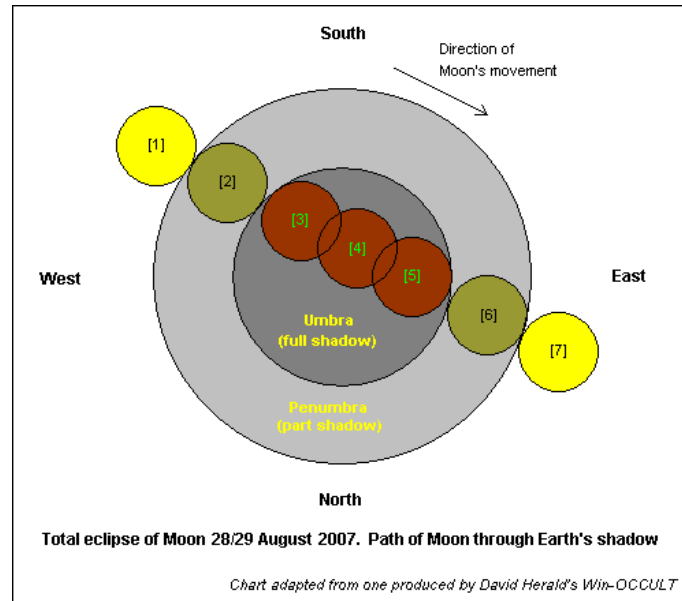
Total Lunar Eclipse for New Zealand, Tuesday 28 August 2007

This month's total eclipse of the Moon is New Zealand's best for several years.

In this lunar eclipse the Sun, Moon and Earth are aligned so that the full Moon will pass closer to the centre of the Earth's shadow than in any eclipse since 2000. This is likely to result in the Moon being relatively dark during the eclipse. The Moon enters the Earth's umbra (dark shadow) at 8:51pm and will be fully eclipsed until 11:22 pm NZST. The timing of the eclipse in the relatively early evening and the fact that the Moon will be in a good viewing position quite high in the sky (with clear skies hopefully!) makes this an excellent eclipse for the viewing public in New Zealand.

New Zealanders should make the most of this one - it is another 7 years (on 2014 October 14) before another total eclipse of the Moon is fully visible for them!

Further details of the eclipse



The full Moon will enter the Earth's penumbral (partial) shadow at 7:52 pm resulting in a barely noticeable, gradual dimming of the Moon.

At 8:51 pm the Moon will start moving into the Earth's umbral (full) shadow. The first contact with the dark shadow will appear at the bottom of the Moon. Over the next hour the shadow will move up the Moon, which will become a very dull and possibly coppery colour. As the Moon loses brightness so more and more stars will appear.

Totality will last for about 90 minutes, from 9:52 pm to 11:22 pm. The Moon will still be visible due to refraction of light through the Earth's atmosphere onto the Moon. Because the atmosphere absorbs more of the blue light, the Moon is likely to appear reddish, just as the sky to the west appears orange near sunset.

At 11:23 the first part of the Moon will re-enter the Earth's penumbra. Over the next hour the brightness will spread across the Moon, with the last of the dark umbral shadow disappearing at just after 12:20 am in New Zealand when the Moon will be almost due north and at its highest.

WARNING.....BAD ASTRONOMY.... (KAREN POLLARD)



"They say this is the closest Mars has been to Earth in 60,000 years."

You've probably received the email, haven't you? The one that breathlessly says that Mars will appear as big as the full Moon in the sky? That says Mars will be closer to the Earth on August 27th than it has in 5000 years, and it may be 2267 until it gets this big again?

Don't believe everything you read. The email is wrong. Mars won't be closest in August, it won't be as big as the full Moon, and it was actually closer back in 2003. But the best part is that this email is a joke. It's a near-exact duplicate of an email sent around the internet back in 2003, August 2003, to be exact, when Mars really did have a close apparition with the Earth. Someone out there in web-land took that old email and started sending it out again. It caught on, and now everyone has seen it.

The email, I hear, is going around again – the one that says that if you go outside next month and look at Mars, it'll be as big as the Moon.

Short and sweet: Mars won't look big to the eye (the email says, not very clearly, that through a telescope Mars will look as big as the Moon does to the eye) in August. It never gets that close. It won't even be particularly bright in August; it'll shine at magnitude 0.4 or so, roughly as bright as the star Aldebaran, which in fact is just a few degrees from Mars in the sky (they make a nice pair, too, since they are both ruddy in colour as well).

For this and more, check out the BAD ASTRONOMY web site:

<http://www.badastronomy.com/bablog/2007/07/27/mars-wont-be-as-big-as-the-moon-get-over-it/#more-1589>

AUGUST 2007 SCHOLARSHIPS – WEB SITE

View General Scholarships at:-

<http://www.canterbury.ac.nz/scholarships/resources/currentnoticeboard.shtml>

College of Science Scholarship

<http://www.canterbury.ac.nz/scholarships/noticeboard/august2007sci.shtml>

NEWS FROM THE PHYSICAL SCIENCE LIBRARY

1. Ideas to Shake Up Publishing - University Publishing in a Digital Age...<http://insidehighered.com/news/2007/07/26/ithaka>
2. Google Looks Up - Google have added Google "Sky" component to Google Earth...<http://news.bbc.co.uk/1/hi/technology/6955787.stm>
3. SciVee - Another "YouTube for Science" - this time brought to you by The National Science Foundation, The Public Library of Science and The San Diego Supercomputer Centre - www.scivee.tv
4. Students prefer smelly text books...http://news.yahoo.com/s/nm/20070822/wr_nm/internet_books1_dc_1
5. Upcoming outages to Library online services. Apologies for any inconvenience!

Patches to Library servers will mean outages to significant parts of the Library web site on the following dates.

- Monday 27th August 7.00am to 9.30am - This will affect most of the web site and the Library catalogue.
- Wednesday 29th August 7.00 to 9.30am - This will affect some parts of the Library web site (including database pages), the blogs and online bookings. The Library catalogue should not be affected.
- UC Research Repository briefly unavailable - Friday 24 August 10am-12noon for upgrades

TRAINING FOR NEW LOOK WEB OF SCIENCE

WEB OF SCIENCE IS IN THE MIDST OF A SIGNIFICANT CHANGE OF LOOK, FEEL & FUNCTIONALITY.

The suppliers (ISI) are making available additional training for any staff/postgraduates who would like to get the most out of Web of Science.

Where: Level 5 Training Room, Central Library, James Hight Building.

When: Tuesday 28 August 9-11 am

PLEASE CONTACT Deirdre Congdon should you wish to attend.

<mailto:deirdre.congdon@canterbury.ac.nz>

What will be covered:

The new Interface layout and design
- Searching multiple databases

- Output of duplicate records the preferred record hierarchy
- Individual database searching
- Exporting of records including Endnote Web access
- Additional Sources – Impact Factors via the Journal Citation Reports
- Unified Indexing application across all Web of Knowledge databases

Citation Trails

- Discover what's being published in your field of interest and be informed automatically about key articles as they appear
- Be alerted to who is citing your work
- Be alerted to your peers as they publish
- Find out who is publishing on your topics without citing your work
- Search for seminal scientific works
- Discover what an Impact Factor score for a journal means

Adam - <http://library.canterbury.ac.nz/people/cath.shtml>

AMUSING FINDA JOB FOR A BARRISTER!!! (PETER COTTRELL)

SHORELINE

*Licensed Café Restaurant
Kaiteriteri*

**Ph (03) 527-8507 Email:
shorelinekaiteriteri@clear.net.nz**

Our busy season is approaching and we are currently seeking to appoint full and part-time staff to the following positions:

**Head Chef
Chefs
Barristers
Front of house / waiting
Takeaway Staff**

We require a mature couple / persons to operate our takeaway area from 1st December to 31st March with the assistance from seasonal staff.

Please contact the Manager for details for these positions.

**Phone: (03) 527-8507
Email: shorelinekaiteriteri@clear.net.nz**

If you have anything you would like to contribute to the Newsletter, please email Ro on rosalie.reilly@canterbury.ac.nz:
Newsletter, Department of Physics and Astronomy, University of Canterbury, Private Bag 4800, Christchurch, Phone: +64 3 364 2404, Fax: +64 3 364 2469.