

2014



CHURCHILL COLLEGE

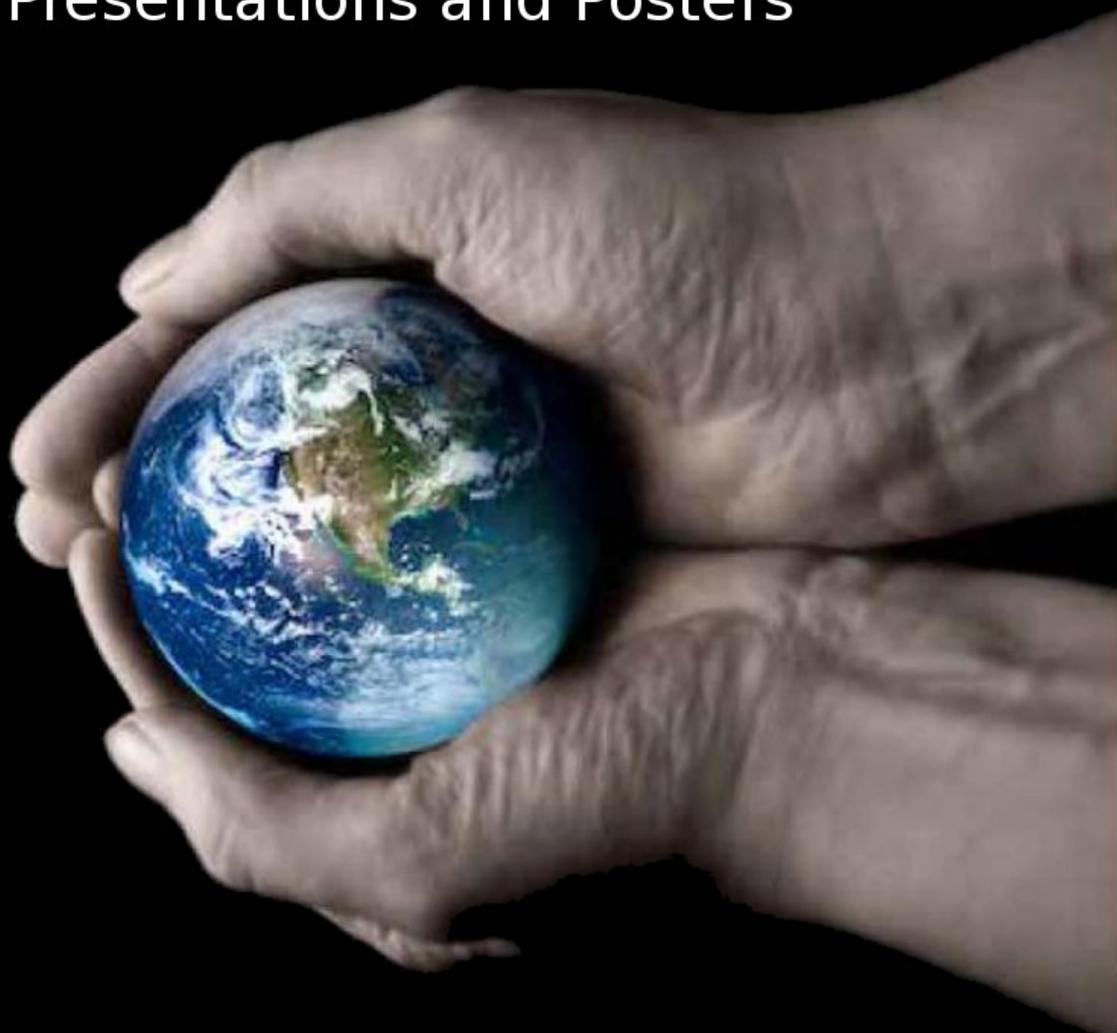


2014

CONFERENCE ON EVERYTHING

Book of Abstracts

Presentations and Posters



Saturday 26th April 3:30pm to 7:30pm

Fellows' Dining Room and Jock Colville Hall

Ahmed Qader
(Department of Engineering)

Characterisation of reactive MgO modified Na₂CO₃-
activated fly ash/slag paste

The environmental impact of Portland cement industry urges more sustainable alternatives. Alkali activated materials are a promising option. Blends of Na₂CO₃-activated fly ash/slag (AAFS) and reactive MgO were studied, finding that activating FA/slag paste with Na₂CO₃ and MgO can develop strengths of ~60 MPa at 28 days.

Alexander Bastounis
(Department of Applied Maths and Theoretical Physics)

Compressed sensing and the RIP

Compressed sensing allows us to take fewer measurements from an MRI scanner and achieve similar results. The Restricted Isometry Property (RIP) was seen as a mathematical reason for the success of compressed sensing. However, the RIP is inadequate and a better explanation (the RIP in levels) will be introduced.

Colin Rothwell
(Computer Laboratory)

Secure Processors: Pushing Security into the Hardware

Computer Security is a massive problem. Traditional attempts at creating secure computer systems focus on modifying software, at the cost of performance. By instead adding security features to hardware, the CHERI processor results in a more secure system with minimal performance overhead.

Elizabeth Wagemann

(Department of Architecture)

Implementing academic research: a pathway for impact.

Building on our research group's experience in Ecuador, Brasil and the Phillipines this talk focuses on the implementation of academic research in collaboration with NGOs. I will draw examples of how we have changed our model to enable a better flow of information and impact in the field.

Isabelle Wynne

(Medieval and Renaissance Literature)

The Other Language: Speaking Bodies in Restoration Life and Stage

, excess, the return of the monarchy and... body language? With examples from an Aphra Behn play and extracts from seventeenth century scieIntriguentific guides, we learn how to survive a royal military ceremony, not insult local nobles and proclaim your love through hand signals... all whilst avoiding “bestial” behaviour faux-pas!

Kent Griffith

(Department of Chemistry)

Insights into the Mechanism of High-rate Li-ion Batteries

High-rate energy storage materials can fully charge your cell phone or laptop on the timescale of reading this abstract. Structural and electrochemical techniques are used to understand the properties of these materials and guide future developement and optimization.

Lisa Volpatti
(Department of Chemistry)

Protein microgels for applications in drug delivery

Amyloid structures constitute a class of highly ordered nanomaterials formed by insoluble protein aggregates. The hierarchical self-assembly of these structures has recently been utilized to develop artificial biomaterials. In this context, we have developed and applied microfluidic techniques to fabricate microgels from amyloidogenic proteins for applications in drug delivery.

Paul Bergen
(Department of Pathology)

The Bacterial Flagellum: A Biological Nanomachine

For sometime, the mechanism by which bacteria assemble their flagella in "bacterial outer space" has been a mystery. Recent work in our lab has elucidated how bacteria utilize the power of the subunits themselves to grow and assemble a highly complex structure far outside the cell.

Roman Sidortsov
(Scott Polar Research Institute)

Before Taking the Plunge: Oil, Polar Bears, Risk,
and Power

This multidisciplinary study focuses on the initial phase of environmental risk governance – risk pre-assessment – of offshore petroleum development in the Barents Region. It aims to determine the ways and extent to which this phase is reflected under the Norwegian and Russian legal and regulatory regimes.

Suzan Ok

(Department of Genetics)

The Invasive Potential of a Defensive Symbiont

What if we could use a parasite to prevent viral disease transmission by mosquitoes? In insects, Wolbachia is a common endosymbiotic bacterium that can confer antiviral protection and manipulate host reproduction. Currently, we are using fruit flies and their Wolbachia to determine a strain with an optimized invasive potential.

Tahreer Fayyad

(Department of Engineering)

Reinforced concrete crack analysis

The buildings are becoming taller and more complex in term of shape and structural frame, so it is very important to overcome the shortcomings in this old material to keep pace with the development of structures. Analyzing the reinforced concrete cracking is my research's aim using Digital image correlation (DIC) technique.

Tobias Nyumba

(Department of Geography)

Tusks, Trunk and Toes: Why Elephants Walk Past Electrified Fences in Laikipia, Kenya

Throughout parts of Africa and other wild elephant habitats, elephants often destroy farm fields and sometimes kill farmers. Electric fences, moats and guns have not helped, as elephants always by-pass them using innovative and effective tools — tusks, trunk and toes. However, flexible and adaptable methods can reduce their ability to use tools and reduce conflicts.

Conference on Everything 2014

- **Poster Display Abstracts** -
6:30 pm – 7:30 pm
Held at the Jock Colville Hall

Wine and Cheese Reception Served Throughout

Alexander Bastounis

(Department of Applied Maths and Theoretical Physics)

Compressed sensing with MRI scanners and Daubechies wavelets – a sensible discretization.

When implementing compressed sensing with an MRI scanner, one aims to compute a wavelet to Fourier transform. On a computer, this infinite dimensional operation is discretized to an inverse wavelet transform followed by a discrete Fourier transform. We illustrate some shortcomings of this approach along with a solution.

Bella Wu

(Department of Chemical Engineering and Biotechnology)

Chemical Quantification of Liquids in Porous Media Using Bayesian Magnetic Resonance

Quantitative measurements of chemical composition in porous media are required to optimise the production of, e.g., fuels, food, and pharmaceuticals. We develop a Bayesian inference approach to analyse magnetic resonance measurements in order to overcome the low sensitivity and broad spectral peaks that limit conventional magnetic resonance spectroscopy.

Calum Williams

(Department of Engineering)

Plasmonic nanoantennas for 3D holographic displays

Creating a true Princess Leia 3D holographic display requires the active control of the wavefront of light. To do this we need clever, multi-functional pixels. Here we create holographic pixel elements using metallic nanostructures which enhance the interaction with light. This effect leads to highly functional holographic devices.

Carl Sequeira

(Department of Engineering)

Loss mechanisms in tidal stream turbines

This poster identifies ways that designers may minimise the ratio of loss to useful power for a tidal stream turbine. This is important as there is an upper limit to the power that may be removed from a tidal stream. Different loss mechanisms are identified and their impact quantified.

Eric Mooring

(Department of Veterinary Medicine)

Effects of opportunistic bacteria on the demography of *Caenorhabditis elegans*

The roundworm *Caenorhabditis elegans* eats bacteria which infect and later kill it. We raised worms in different cohort sizes and fed them different bacterial species. We found that diet affects survival. But survival does not strongly affect population growth; how many eggs worms lay and at what ages matters more.

Hannah Stern
(Department of Physics)

Can you measure the movement of an electron on a femtosecond (10⁻¹⁵s) timescale?

Understanding the electron movement in semiconductors is critical to the design of better solar cells. We do this by capturing a 'snapshot' of electrons using a technique called Transient Absorption Spectroscopy. Here I show how this technique has led to ground-breaking discoveries relevant to organic photovoltaic design in the Cavendish Laboratory.

Jan Freyberg
(Department of Chemistry; Department of Psychiatry)

Visual Psychophysics in Autism - Mutual Inhibition in the Brain

With psychophysics, we can try and model the visual system of the brain, with input (visual stimuli) and output (behaviour) known. Non-invasive, we can use this to study diseases like autism, to try and get at parts of the brain in a condition notoriously difficult to study.

Jan Mertens
(Department of Physics)

Graphene Controls Colour of Plasmonic Nanoantennas

Graphene enables us to create one-atomic thin gaps between flat gold and gold nanoparticles. These so-called plasmonic antennas define the colour of the system which is highly sensitive to the environment. Environmental changes lead to colour changes that create the basis for an ultrasensitive sensor based on quantum mechanical tunnelling.

Jessy Zhou

(Department of Engineering)

Business Ecosystem of Rare Earths Industry

This is an action research on multi-level strategies of rare earths industry and its related manufacturing, capturing higher commercial value while improving the health of rare earths business ecosystem that could be in turn beneficial to firm profitability as well as socio-economic and environmental sustainability.

John Wong

(Department of Engineering)

Simple lattice modelling for 'fracking'

Fracking, a technique to create fracture in rock by high pressure fluid, has wide engineering applications but modelling is challenging as rock is non-uniform with features in different scales. Modelling rock by lattices is proposed as a simple approach for this multi-physics and multi-scales problem.

Livy Kenyon

(Clinical Medicine)

Medically Unexplained Symptoms - Psychogenic Non-Epileptic Seizures (PNES)

This study investigated the effect of patient diagnoses changing from epilepsy to PNES using a standardised assisted questionnaire and telephone interview. We recommended that better education is needed at diagnosis. Although most patients had been withdrawn from epilepsy medication, access to psychotherapy was varied and dependant on the referring county.

Olivia Remes

(School for Public Health Research)

Systematic review of reviews on the prevalence of anxiety disorders

One of my project aims consists of providing a synthesis of extant research on the prevalence of anxiety disorders. This is achieved through a summary of systematic reviews on the prevalence of common anxiety disorders, shedding light on disease trends across population sub-groups, settings, and time.

Radhika Kothari

(Department of Geography – Conservation Leadership)

Status of Snow Leopards and Conflict Assessment in Indian Trans-Himalayas

Ladakh in the Indian Trans-Himalayas is one of the key habitats for snow leopards. This study was undertaken to determine the presence status of snow leopards and understand the human-wildlife conflict issues, also highlighting the overlaps and co-existences in the landscape.

Timothy Roberts

(Department of Engineering)

Bayesian Denoising/Deblurring of Poisson-Gaussian Corrupted Data Using Complex Wavelets

In this work we summarize our algorithm used to denoise/deblur observations which result from a mixture of Poisson and Gaussian noise sources. Our algorithm, MSIST-P, is an extension of the MSIST algorithm, in that it accounts for a spatially varying statistical distribution.

For more information, please visit the MCR and College website pages for the Conference:

mcr.chu.cam.ac.uk/activities/conference-on-everything/

chu.cam.ac.uk/events/mcr-conference-everything/

With many thanks to

Sir David Wallace for his continued enthusiasm and support for our student conference and helping to brain storm so many good ideas for it!

Shelley Surtees, Tim Cooper and Carol Robinson for helping to organise everything quickly despite our errors and supporting the student conference with very generous use of some very expensive equipment.

Paula Halson, Naomi Morris and Livia Argentesi for helping us to advertise to the breadth and depth of the Churchill community.

Rebecca Sawalmeh for all the help that she has given in organising this at various stages.

All the conference teams who work so hard to set things up for us but whom we rarely get to thank in person.