



Newsletter

Bovine TB and badgers the science behind the controversy

The stakes are high. Cattle TB is currently costing UK taxpayers £90 million a year to control. Badger culling, as a method to control TB in cattle, is highly controversial. The science base relating to cattle TB control is often misunderstood (sometimes wilfully). When should a policy be called “science-based”? And does “science-informed” policy deliver what it appears to promise?

As part of the *Infectious Disease (IDD) Dynamics* programme, Christl Donnelly visited the Institute to give



Christl
Donnelly

a special lecture on the science and the UK policies as they stand today.

Christl Donnelly is Professor of Statistical Epidemiology at Imperial College, London. She was the deputy chair of the Independent Scientific Group that designed, oversaw and analysed the results of Defra’s Randomised Badger Culling Trial (1997–2007).

She was joined by James Wood (Alborada Professor of Equine and Farm Animal Science at the University of Cambridge), who addressed the issue of cattle controls.

Denis Mollison, who was both the Independent Statistical Auditor to the



Randomised Badger Culling Trial, and one of the IDD programme organisers, chaired the event.

The lecture is available to view online at www.newton.ac.uk/programmes/IDD/special_lecture.

Julian Huppert MP at I-CAMP 2013

This year’s Inter-Continental Advanced Materials for Photonics (I-CAMP) Summer School was held in conjunction with the *Mathematics of Liquid Crystals* programme between 26 June and 6 July. The event provides interdisciplinary training for students and early-career researchers in the areas of materials science, optics, photonics, biophysics, nanoscience, and related fields. On 5 July, the Member of Parliament for Cambridge, Julian Huppert, attended the event to present a talk about the interface between scientific research and policy-making.

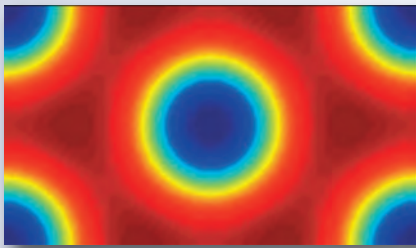


In this issue...

- Current programmes
- Women in Mathematics Day 2013
- Donation for INI
- Group visits to the Institute
- Upcoming events
- Transatlantic interview with Jerry Ericksen

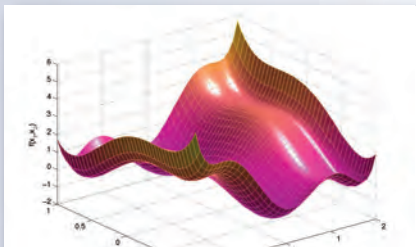
Current and recent scientific programmes update

Mathematical Modelling and Analysis of Complex Fluids and Active Media in Evolving Domains (May–Aug 2013)



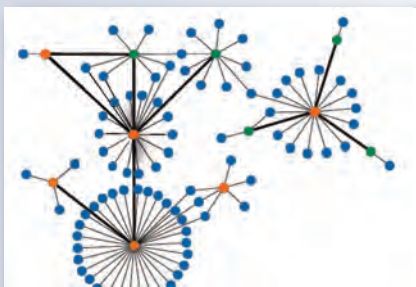
Advanced mathematical techniques were developed in close interaction between applied mathematicians and ‘users’ in various other scientific fields. An aim of the programme was to establish or renew communication between scientists from a wide spectrum of specialisms from geometrical mechanics to physics of cell locomotion. Beside the continuous seminar series with the visiting fellows and programme participants, the wider community were also involved, particularly early-career scientists who attended the two embedded workshops and an extended summer school.

Polynomial Optimisation (Jul–Aug 2013)



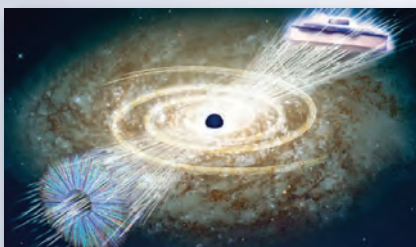
The increased attention this topic has received in recent years is due to its elegant theory, wide range of applications, and its inherently interdisciplinary nature. The programme attracted numerous well-established researchers and young talents from operational research, theoretical computer science, engineering, control theory and pure mathematics, who communicated easily across the boundaries between their individual disciplines. The first week consisted of a summer school and workshop, with the remaining weeks devoted to algebraic approaches, convex relaxations, algorithms and software.

Infectious Disease Dynamics (Aug–Sep 2013)



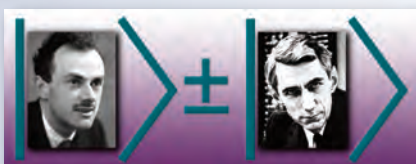
This programme brought together researchers in stochastic modelling, differential equations, public health and ecology, to consider the current state of the field and its future directions, 20 years after the *Epidemic Models* programme of the Institute’s first year. It began with a workshop for 100 participants who heard reviews of progress on many fronts, and was presented with a wide range of challenges for future research. The 30 longer-term participants went on to more detailed discussions - a special journal issue on epidemic challenges is planned - at the same time forming new research partnerships with the aim of tackling some of these challenges.

Mathematics and Physics of the Holographic Principle (Sep–Oct 2013)



The HOL programme brought together more than 150 researchers with a broad spectrum of expertise, from areas such as condensed matter physics, string theory, numerical general relativity and the theory of non-linear partial differential equations. During the programme, cross-field fertilisation provided new insights and in some cases tantalising preliminary progress. The most striking examples include the application of AdS/CFT duality to high dimensional field theories, superfluid turbulence, massive gravity and the physics of cuprates, and novel field theory phenomena related to extremal black holes.

Mathematical Challenges in Quantum Information (Aug–Dec 2013)



Quantum Information Science ranges from fundamental physics to hard applications in communication and engineering. Taking as the basis of investigation the mathematical structure of quantum mechanics, there are many outstanding conceptual and, in particular, mathematical problems, which are the motivation and the subject of the current programme.

The programme began with a workshop that brought together some of the leading experts in the field, and highlighted current challenges and open problems. In mid-October a second workshop on *Quantum Marginals* broadened the horizon of the programme, bringing in experts from seemingly remote areas in representation theory, geometry and probability. The main activity of the programme is free interaction, with regular meetings and seminars between the longer term participants, representing a broad cross-section of some of the best researchers in the field, who from the beginning engaged in a lively exchange of ideas.

Further details on all programmes can be found at www.newton.ac.uk/programmes

Women in Mathematics Day 2013

Women in Mathematics Day is an annual event organised by the London Mathematical Society. This year the event took place between 18–19 April 2013 and was hosted by the Institute.

Talks were given by women at different stages of their careers to provide advice and share their research. There were also a number of practical sessions to help women get the most out of their careers in mathematics.

The event provided an opportunity for early-career researchers to meet in an informal setting and talk with a variety of women who are active and successful in the mathematical sciences.



Tahel Ronel
for her poster *Inductive logic and rationality based on symmetry*.

A £50 book token for the best poster presentation was awarded to Tahel Ronel from the University of Manchester

More information together with an image gallery and videos from all the sessions, can be found online at www.newton.ac.uk/programmes/WIM/wimw02.



Donation for INI



On 9 October the Director welcomed Mr Lawrence Staden, Managing Director of GLC, and his partner who visited to present a

further cheque to support the activities of the Institute. Mr Staden was delighted to see his name added to the honours board at the entrance of the building.

INI is extremely grateful for the generous support of donors such as Mr Staden. Donations provide a valuable source of income to support the world class research undertaken by the 1,500 mathematical scientists who visit the INI annually.

If you would like to contribute to the success of the Institute in this way, details can be found on our website at www.newton.ac.uk/support.

Group visits to the Institute

During the summer INI was pleased to give tours and talks to several different groups of aspiring mathematicians.



A group of undergraduates from the University of Delhi visited the Institute in June with their course tutor Professor Sachi Srivastava. The visit to the Institute was a highlight of a wider mathematical tour to the UK that the students had won in a competition held in honour of Srinivas Ramanujan. Whilst in Cambridge the group also visited Trinity College where Ramanujan was based.

Another group visit was organised by the London International Youth Science Forum (LIYSF). LIYSF is a two-

week residential event for young scientists aged between 17 and 21 from more than 60 participating countries. The group visited the Institute in August and the students were given a tour of the facilities before enjoying an entertaining mathematical lecture by Deputy Director Dr Christie Marr.



In July a group of Year 13 students visited as part of a widening participation initiative from the STEP Study School organised by the Cambridge Admissions Office and Centre for Mathematical Sciences. The aim is to provide study support to Year 13 students from the UK who have been offered a place to study Mathematics at Cambridge but do not receive additional help from their school or college in preparing for the Sixth Term Examination Papers (STEP), an exam which



forms part of the conditions for their offer. Students took a break from this intensive course to be inspired by a tour of the Isaac Newton Institute.

If you are interested in booking a group visit to the Institute, please email info@newton.ac.uk.



Staff in the Spotlight



Jane Leeks

What is your job and how long have you worked at the Institute? I am the Knowledge Transfer Facilitator for the Turing Gateway to Mathematics (TGM) and I started on 23 March 2013 – the date the TGM officially launched.

What does your job involve? My main aim is to bring mathematicians together with users of mathematics. The TGM is very much at the applications end of things – using mathematics to solve real life problems, whether that be within other academic disciplines, or in industry. I act as a facilitator and sometimes project manager of these types of activities.

What have been the highlights of your job so far? Everything! No two days are ever the same. One minute I can be engrossed in the world of modelling for physiological systems or planning an event for modelling of financial risk, the next I could be match making mathematicians to work with space industry projects on areas such as optimisation or data processing. Maths is so cross-cutting, it basically underpins pretty much everything!

What do you enjoy most about your job? Working with so many interesting and clever people has to be one of the best bits. If we are talking specific projects, it has to be the activity in optimisation in space engineering. This is something which spun out of a recent Isaac Newton Institute *Open For Business* workshop on *Polynomial Optimisation*. We are now on the verge of setting up a UK working group to include industry and academia with the European Space Agency.

Do you have any hobbies? Lots, but it's hard to find time for them, especially with two boys to look after!

What is your favourite book? *Lord of the Rings*.

What is your greatest luxury in life? Having a pedicure.

Who would be your ideal dinner party guests? Alan Turing and Isaac Newton of course!

Transatlantic interview with Jerry Ericksen

In a vivid illustration of the impact of new technologies on activities at the Institute, *Mathematics of Liquid Crystals* programme organiser Sir John Ball held a videoconferencing interview with Professor Jerry Ericksen, who is based in Oregon. Professor Ericksen is one of the founding fathers of the theory, and gave a gripping account of how his ideas developed. See the full interview at www.newton.ac.uk/programmes/MLC/seminars/2013053011001.html.



TGM Turing Gateway to Mathematics

New website launched

A new website has been launched to promote the activities of the Turing Gateway to Mathematics (TGM) initiative, which held its inaugural events at the Institute in March of this year. Included in the website are the TGM's Mission Statement and FAQ, as well as listings of upcoming and past events - see www.turing-gateway.cam.ac.uk.

Upcoming events and activities

Mathematical Showcase

29 January 2014

This half-day event will include short talks at the Isaac Newton Institute as well as an exhibition at the Centre for Mathematical Sciences (CMS), and will finish with a drinks reception. The main objective is to showcase relevant expertise at the Institute and also Cambridge's Department of Applied Mathematics and Theoretical Physics (DAMTP), to senior industry stakeholders.

Details will be available on the Institute website shortly.

Cambridge Science Festival

22 March 2014

The 20th Cambridge Science Festival will take place on 10–23 March 2014. This event aims to provide the public with opportunities to explore and discuss issues of scientific interest and concern and to raise aspirations by encouraging young people to consider a career in science, technology, engineering or mathematics. The theme of the 2014 festival will be patterns and structures, which will be explored by a guest speaker at the Isaac Newton Institute on Saturday 22 March.

www.cam.ac.uk/science-festival



For all scientific events at the Institute please visit www.newton.ac.uk/events.

Isaac Newton Institute for Mathematical Sciences

20 Clarkson Road, Cambridge, CB3 0EH, UK

tel: 01223 335999 email: info@newton.ac.uk web: www.newton.ac.uk



This Newsletter is published twice per year (April and October)