LMS PROSPECTS IN MATHEMATICS

Report

The *LMS Prospects in Mathematics* conference, now in its sixth year, aims to give final-year undergraduate and MSc students an overview of the many and varied opportunities for mathematical research that exist at universities in the UK. The most recent meeting was held at the University of Manchester from 18 to 19 December 2012 and was attended by just under sixty students.

Following a brief overview of PhD funding opportunities and general advice for PhD applicants, Colm Caulfield (Cambridge) started the research talks with his presentation *Shaken or stirred? Inherent nonlinearity in fluid dynamics* in which he described many strands of current research in fluid mechanics, stressing the potential for (and the benefits of) close interactions between theoretical, computational and experimental studies. He was followed by Jane Hutton (Warwick) whose talk *Modelling life and death: good life or bad drugs?* described some of the challenges in medical (and other) applications of statistics, frequently drawing on her experience as an expert witness in court cases. A gap in the programme, created by the last minute cancellation of one of the speakers, was filled by an inspired Manchester-based double act: Mark Kambites' impromptu, blackboard-based introduction to Tropical Mathematics was followed by Francoise Tisseur's illustration of the (unexpected) benefits of interactions between numerical analysts and pure mathematicians: she demonstrated how results from Tropical Mathematics allowed significant improvements to a numerical algorithm for quadratic eigenvalues problems.

Coffee and cakes were followed by presentations from the three mathematical Doctoral Training Centres at Warwick (MASDOC), Lancaster (STOR-i) and Cambridge (CCA). Elizabeth Fisher (from the LMS) then gave a brief overview of the LMS's activities before Mark Holland (Exeter) resumed the research talks with an introduction to Dynamical Systems, *Recurrence and chaos in dynamical systems*, assisted by various hands-on experiments which provided beautiful illustrations of chaotic behaviour. Carmen Molina-Paris (Leeds) finished off the first day with an overview of *Mathematical immunology at the molecular, cellular and population scales*.

The dinner on the Atrium Bridge of the Alan Turing Building provided ample opportunity for mingling between academics and the potential PhD students – the (mathematical) discussions were still in full flow when we had to vacate the building at 9 pm.

Darren Crowdy (Imperial) started proceedings on Wednesday with his hugely entertaining talk *Lotus leaves, ketchup, and boundary value problems, fixed and free, in applied mathematics* for which he should probably have been awarded a prize, given the level of audience participation he achieved. Anand Pillay (Leeds) delivered an impressive overview of *Logic, model theory, applications* after which speakers and participants were treated to coffee and yet more cakes. Nick Bingham (Imperial) convinced the audience that there is *Probability everywhere* before Chris Hughes (York) delivered an enthusiastic lecture on *Applications of random matrix theory*. Lunch was followed by Rob Scheichl's (Bath) talk *Multiscale problems: Numerical analysis and scientific computing* which illustrated the wide range of practical applications in which multiscale problems arise, and demonstrated how novel numerical methods allow the efficient solution of the resulting stochastic PDEs. Sarah Whitehouse (Sheffield) concluded the meeting with a beautiful talk on *Algebraic structures in topology*.

Overall, the meeting was hugely enjoyable for everybody. The speakers had been instructed to represent their respective UK research communities (rather than to 'pitch' just for themselves). This aim was achieved admirably and gave the students an impression of how vibrant mathematical research in the UK is. It was interesting to observe much unexpected overlap between the talks, showing common trends in superficially distinct areas of mathematics, thus counteracting the impression that mathematics is divided rigorously into the traditional sub-disciplines of Pure, Applied and Statistics/Probability. Specifically, Nick Bingham's claim that *Probability [is] everywhere* was amply demonstrated throughout the meeting. The students clearly enjoyed the opportunity to interact with leading mathematicians and their enthusiasm bodes well for the future of the discipline.

Photographs from the conference can be found on the back cover of this *Newsletter*.

Matthias Heil
University of Manchester

REVIEW

The Two Body Problem a screenplay by Farber and Frenkel

Edward Frenkel is a remarkable mathematician whose achievements in various areas of contemporary mathematics such as the Langland's correspondence place him at the forefront of *avant garde* pure mathematics. He is also a mathematician that has sought unusual outlets to display his interests. His introductory calculus lectures on You Tube have more than 100,000 views, which tells you something of his performance ability. More remarkable was the controversial film short *Rites of Love and Math*, which was a mathematics-centred homage to the Japanese Nobel prize-winning author Mishma's *Rites of Love and Death*. *Rites* won prizes at

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the two-body problem
by thomas farber & edward frenkel
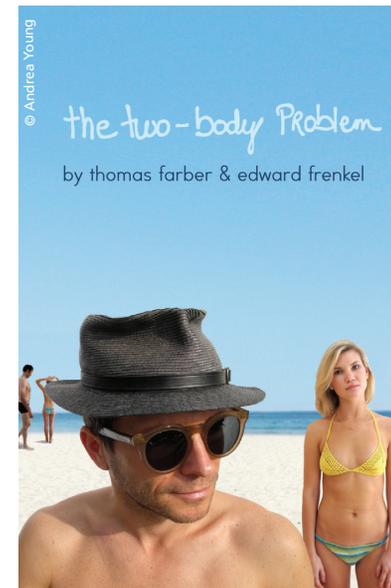
Cannes and has been shown at film festivals throughout the world. In Rites, Frenkel wrote the script and played the male lead himself. In this film, the mathematician is at the centre of the story, rather than mathematics itself. In *The Two Body Problem*, this is even more the case.

The story is one of love, sex and friendship. Again it is the mathematician (along with his author friend) that is at the nexus of the story whilst the mathematics is a sideline providing the occasional trope. Symmetry, set theory and an entertaining and novel application of catastrophe theory (that I doubt René Thom had in mind but who knows) are topics discussed in passing. The two main protagonists are a mathematician and a writer who meet on the French Riviera and spend time discussing women, mathematics, love and writing. Given that Thomas Farber (Frenkel's co-author) is a professor of literature in Berkeley, one has a suspicion that this

work is a somewhat autobiographical. The style of writing and dialogue are reminiscent of David Mamet; it's sharp, funny and yet there is a depth to the conversations that point to the characters' fate and history.

The humanising of mathematics is laudable but really it is the humanising of the mathematician that is the real success. In cinema, mathematicians and scientists are typically portrayed as either James Bond baddies who have a developed a terrible virus/laser/nuclear weapon, or as hopeless (always male) nerds who have no chance of attracting the opposite sex. The mathematician in Frenkel's screen play is sexy, bold and confident. He makes no apology for who he is and communicates a love of the subject, and his excitement by it.

Recently Frenkel has had other literary successes. It is clear that his talents extend in moving beyond the traditional mathematical realm of journals and seminars. How much of the mathematics remains is a question. But does it matter? The humanising of the mathematician is a goal in itself, and in that Farber and Frenkel succeed admirably.

David Berman
Queen Mary, University of London

The book was originally published by Andrea Young Arts in 2010, with a revised edition published in 2012 (www.amazon.com/Two-Body-Problem-Thomas-Farber/dp/0982012527).

CONFERENCE FACILITIES

De Morgan House offers 40% discount on room hire to all Mathematical charities and 20% to all not-for-profit organisations. Support the LMS by booking the next London event at De Morgan House.

Call us now on 020 7927 0800 or email roombookings@demorganhouse.co.uk to check availability, receive a quote or arrange a viewing of the venue.

CALENDAR OF EVENTS

This calendar lists Society meetings and other mathematical events. Further information may be obtained from the appropriate LMS *Newsletter* whose number is given in brackets. A fuller list is given on the Society's website (www.lms.ac.uk/content/calendar). Please send updates and corrections to calendar@lms.ac.uk.

FEBRUARY 2013

4 Experiences of Learning Programming within a Mathematics Course, Bath **(421)**
13 Hyperbolic Equations Workshop, Loughborough **(421)**
19 *Are Averages Typical?* Gresham College, London
20 Geometry and Topology Day, University College London **(421)**

MARCH 2013

1 LMS Mary Cartwright Lecture, London (422)
14 David Crighton Lectures, Royal Society, London **(422)**
18 LMS Northern Regional Meeting, Newcastle University (422)
18-22 Triangulations and Mutations Workshop, Newcastle **(421)**
18-22 Explicit Methods for Modular Forms Workshop, Warwick **(422)**
18-22 Analytical and Computational Paths from Molecular Foundations to Continuum Descriptions Workshop, INI Cambridge (419)
19 *Modelling the World*, Gresham College
19 Large Evolving Networks Workshop, Bristol **(421)**
20 Geometry and Topology Day, University College London **(421)**
20-22 Young Functional Analysts' Workshop, Sheffield **(421)**
22-23 NBFAS, Sheffield **(421)**
25-26 Data Analysis for Cyber Security Workshop, Bristol **(421)**
25-27 Quantitative Modelling in the Management of Health and Social Care 7th IMA Conference, Central London (416)
25-27 Distinguished Lecture Series, Bristol **(422)**

25-28 BMC, Sheffield (420)
26 LMS Meeting at BMC, Sheffield
26 Contemporary Challanges for the Delivery of Undergraduate Mathematics Courses, Sheffield **(421)**

APRIL 2013

2-5 Operads and Deformation Theory INI Conference, Cambridge (418)
2-5 Char p Methods in Algbraic Geometry, Imperial College, London
3-5 Quantum Fields, Gravity and Information, Nottingham **(422)**
8-9 Mathematics in Finance IMA Conference, Heriot-Watt University (416)
8-12 Advances in Number Theory and Dynamical Systems Conference, Bristol **(421)**
9-11 Large Deviations and Asymptotic Methods in Finance Workshop, Imperial College London **(422)**
9-12 BAMC, Leeds **(421)**
10 Finite Simple Groups, Algebraic Groups and their Impact, Birkbeck, London
12-13 Integrable Models, Conformal Field Theory and Related Topics, Hertfordshire
15-17 Conformal Geometry and Function Theory in Mapping, Imaging and Sensing, Imperial College London
15-19 Geometric and Topological Graph Theory Workshop, Bristol **(421)**
18-19 Women in Maths Day, Cambridge
25 Quantum Algorithms Day, Bristol **(421)**
25-26 Young Topology Meeting, Imperial College, London **(422)**

MAY 2013

1-3 Mathematical Models of Biological Evolution, Leicester
10-11 String Math UK, Surrey
15 LMS-Gresham Lecture, Peter Cameron, Museum of London **(422)**

JUNE 2013

5 Combinatorics One Day Meeting, Oxford
10-14 LMS Invited Lecturers, Fedor Bogolomov, Edingburgh (422)
11 LMS Midlands Regional Meeting, Leicester (422)
11-14 MAFELAP 2013, Brunel

12-14 Advances in Surface Theory Workshop, Leicester **(422)**
17-20 Young Researchers in Mathematics 2013, Edinburgh
20-21 High-Dimensional Inference with Applications, Kent
24-28 Liquid Crystal Defects and their Geometry INI Workshop, Cambridge **(421)**
24-28 Dynamics of Suspensions, Gels, Cells and Tissues INI Workshop, Cambridge **(422)**
30-5 Jul British Combinatorial Conference, Royal Holloway College, University of London **(422)**

JULY 2013

1-2 Bifurcation Theory, Numerical Linear Algebra and Applications, Bath
1-4 Dense Granular Flows 2nd IMA Conference, INI, Cambridge (416)
3-13 *Polylogarithms as a Bridge between Number Theory and Particle Physics* LMS-EPSRC Durham Symposium
5 LMS Meeting, London
8-12 Modern Nonlinear PDE Methods in Fluid Dynamics, LMS-EPSRC Short Course, Reading **(422)**
15-19 Polynomial Optimisation Summer School and Workshop, INI, Cambridge (420)
15-25 Graph Theory and Interactions LMS-EPSRC Durham Symposium
29-2 Aug Computational Group Theory, LMS-EPSRC Short Course, St Andrews **(422)**

AUGUST 2013

3-11 Groups St Andrews 2013, St Andrews (410)

SEPTEMBER 2013

2 Heilbronn Day, Groups and Their Representations, Manchester
3-6 Brauer's Problems in Representation Theory – 50 years on, Manchester
9-13 Spectral Geometry, Chaos and Dynamics, Loughborough
11-13 Mathematics of Surfaces 14th IMA Conference, University of Birmingham (416)
22-27 Heidelberg Laureate Forum, Heidelberg **(422)**