



# School of Mathematics Newsletter

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## Dr Anton Evseev

It is with great sadness that we report the death of Dr Anton Evseev, Lecturer in the School of Mathematics, who passed away suddenly and unexpectedly on 21 February 2017 at the age of 34. Anton was a talented and dedicated academic who contributed much, both to the world of mathematics and the School of Mathematics.

His mathematical achievements entail sixteen papers with twelve different coauthors, in particular providing solutions to the Külshammer–Olsson–Robinson and Turner conjectures.

His contribution to School life included teaching Galois theory and linear algebra, being the Deputy Director of the Graduate School and algebra seminar organiser, and supervising two PhD students and numerous undergraduates.

Anton received an MMath from the University of Oxford in 2003 and completed a DPhil in 2007. He held the position of Research Fellow at Selwyn College, University of Cambridge, and at Queen Mary, University of London, before joining us in the School of Mathematics in October 2011. His research interests mainly focused on the representation theory of finite groups, and in particular the symmetric groups and related objects.

We will sorely miss Anton.

Colleagues in the School of Mathematics are making an album for Anton's family. We are looking for images that celebrate his life; pictures can

include Anton with his friends and colleagues. We also welcome any images from significant events in his personal and work life. If you would like to contribute to the album, please send an email to [in-memory-of-anton@opencodes.org](mailto:in-memory-of-anton@opencodes.org).

## Upcoming external research funding opportunities

### The EPSRC

The Engineering and Physical Sciences Research Council (EPSRC) is the main British Research Council that provides government funding for grants in mathematics. An overview of EPSRC funding in mathematics can be found [here](#). This webpage gives a detailed overview of the main funding opportunities that the EPSRC provide.

#### *EPSRC First Grants*

First grants are designed for early career academics. In particular, applicants must be within 36 months of their first academic lecturing appointment in a UK university, or the probation period of their first lecturing appointment. Funding is capped at 125,000 pounds over a maximum of two years. Typically such a grant can cover some staff and travel expenses, as well as a one-year postdoctoral position. The School of Mathematics has had huge success with this scheme in recent years. Indeed, over the last 9 months alone Allan Lo, Alessio Martini, Will Perkins, Maria Reguera and Sergei Sergeev have all been awarded such grants. Applicants can apply **at any time** and prioritisation panels are usually held 4-5 times per year. More information about the scheme is available [here](#).

#### *EPSRC Standard Grants*

These grants are very flexible and can be for small, short-term projects as well as long-term multi-million pound programmes. There is no limit on the value or length of the grant and applications are welcome **at any time**. Currently Alex Bespalov,

Daniela Kühn, Olga Maleva, Deryk Osthus, Yulii Shikhmurzaev and Dave Smith are all supported by such grants. More information about the scheme is available [here](#).

#### *EPSRC Fellowships*

A Fellowship is a personal award, ‘designed to provide the recipient with the necessary support to establish or further develop themselves as a leader of the future’. There are three types of EPSRC Fellowship: Postdoctoral; Early career; and Established career. Applicants can choose which of the three fellowships most suits them and there are no eligibility rules based on years of post-doctoral experience or whether you hold or do not hold a permanent academic position. Currently applications must fit one of the following research themes: Statistics and Applied Probability; Intradisciplinary Research; New Connections from Mathematical Sciences; and Mathematical Aspects of Operational Research. The School of Mathematics currently has two EPSRC Fellows, Daniela Kühn and Andrew Treglown. An overview of the scheme is provided on this webpage.

#### **European Research Council**

Even though ‘Brexit means Brexit’, it does not mean UK academics cannot tap into EU funding sources. Indeed, the government has guaranteed that EU funded projects will be “underwritten” by the UK after Brexit.

The ERC has three main grants: ERC starting grants are for researchers of any nationality with 2-7 years of experience since completion of their PhD. The next call for applications for this scheme is due to open in the summer. Meanwhile ERC consolidator grants are for academics with between 7 and 12 years of post-PhD research experience; the call for this scheme will open in the autumn. Finally, advanced grants are for more senior academics. The call for these grants opens on **16 May**. Jon Bennett, Daniela Kühn and Deryk Osthus have all been awarded ERC grants in recent years.

#### **Marie-Curie Fellowships**

Currently the School hosts two Marie-Curie Fellows, Dr Rieuwert Blok and Dr Jonathan Meddaugh. Marie-Curie Individual Fellowships are open to researchers of all nationalities with a PhD or at least 4 years of research experience. The fellowship provides funding for researchers to spend 2-3 years undertaking research outside of their country of residence. *European Fellowships* allow for academics from anywhere in the world to be hosted by the

University of Birmingham. *Global Fellowships* allow European academics to visit a university outside of Europe for up to two years, before returning to Birmingham for a year. The deadline for applying to these schemes is **14 September 2017**. Please contact Dr Karin Rade ([k.rade@bham.ac.uk](mailto:k.rade@bham.ac.uk)) if you have any questions about the fellowships.

#### **The Leverhulme Trust**

The Leverhulme Trust is one of the largest grant-making foundations in the UK. The trust offers a wide range of grants for academics at all stages of their careers. At the moment there are several calls for proposals:

##### *Research Project Grants*

These offer up to 500,000 pounds over five years for research on a topic of the applicant’s choice. Grants cover salary and research costs directly associated with the project. Initial ‘outline applications’ are welcome **at any stage**. Then normally within 3 months, candidates are informed whether they have been approved to move onto the ‘detailed application’ stage. More information about this scheme can be found [here](#).

##### *Philip Leverhulme Prizes*

Philip Leverhulme Prizes recognise the achievement of outstanding researchers whose work has already attracted international recognition and whose future career is exceptionally promising. Every year the prize scheme makes up to thirty awards of 100,000 pounds across a range of academic disciplines. The 2017 round opened on 9 January 2017 and closes to nominations on **17 May 2017**. This year mathematics is one of the focus areas. For more information [click here](#).

##### *Visiting Professorships*

These are awarded to UK institutions that wish to invite an eminent researcher from overseas to enhance the knowledge and skills of academic staff or the student body within the host institution. The scheme covers maintenance, travel expenses and research costs. Visiting Professorships last for between three and twelve months. The closing date for applications is **11 May 2017**. More information can be found [here](#).

#### **The Royal Society**

The Royal Society offers a range of funding opportunities, and currently the School has one Royal Society Fellowship, awarded to David Craven. At the moment the Royal Society has two open calls. The Sir Henry Dale Fellowships are designed ‘for

outstanding post-doctoral scientists wishing to build their own UK-based, independent research career addressing an important biomedical question'. The preliminary application deadline is **5 April 2017** and the full application deadline is **12 June**.

Industry Fellowships are for academic scientists who want to work on a collaborative project with industry and for scientists in industry who want to work on a collaborative project with an academic organisation. The deadline for applying for such a grant is **13 April 2017**.

#### **Other grants**

The London Mathematical Society (LMS) has a range of research grants, which can be used to organise workshops, attend conferences and for research visits. More details can be found here.

The Institute of Mathematics and its Applications (IMA) also has a range of grants. In particular, in recent years many PhD students in the School have successfully applied to the 'small grant' scheme to cover expenses to attend international conferences. See this webpage for more details.

### **Institute of Advanced Studies Internal Funding Programmes**

IAS has a range of funding programmes designed to support and develop colleagues' cross disciplinary research ideas, longer term projects and collaborations with world leading academics. If you are interested in making proposals, or have any questions, please contact Sue Gilligan (s.gilligan@bham.ac.uk) who will be pleased to give you more information about all our programmes and support.

#### **IAS Workshops**

Topics should be cross-disciplinary, bringing together expertise from across the breadth of our University to address major cross-cutting ideas that are important, relevant and timely.

Upcoming deadlines: 15 May, 12 June, 17 July 2017

#### **Distinguished Visiting Fellows Programme**

The IAS welcomes nominations from colleagues to bring outstanding academics from global leading institutions around the world for research collaborations and the enrichment of campus life.

Upcoming deadline: 8 May 2017

#### **Research Investment Scheme (RIS)**

RIS-DVF programme: intended to create long-term collaborative, multidisciplinary research pro-

grammes with Distinguished Visiting Fellows.

RIS-post-workshop programme: will allow exciting ideas and conversations from IAS workshops to be explored and tested so as to get preliminary results to seek external support for those ideas.

Upcoming deadline: 30 March 2017

**IAS Internal Fellowship Programme** provides resource and time to bring University of Birmingham Institute of Advanced Studies Fellows (IASFs) together with leading global academics, Distinguished Visiting Fellows (DVs), to nurture research collaborations, in particular those with a cross-disciplinary focus. Please contact Sue Gilligan for further details and deadlines.

### **Npower Forecasting Challenge**

by BETH CAIRNS, JAMES GIBSON, MATT RAY AND CHRIS VILE

We recently participated in the national npower forecasting challenge, finishing as runners up. We decided to enter this competition after speaking to some representatives of npower at a maths careers fair and felt it was an interesting opportunity to apply our maths skills to a real-world problem; in the hope of winning 1000 pounds and a summer internship.

For the competition, we were tasked with forecasting electricity demand based on weather conditions using vast amounts of past data. This included lots of different possible factors such as temperature, rainfall, solar radiation and other weather conditions. Over the first four weeks of the competition, we used the data to create forecasts for electricity usage for three six month periods. We did this by analysing the data in excel and creating a model to forecast electricity demand based on the weather variables. This part of the challenge helped develop our analytical skills and was an interesting use of the applied mathematics (in particular statistics) we had learned before and during university, but not had a chance to use outside of academia. At the end of the three forecasting rounds we were in second place and subsequently invited to the final at the npower headquarters in Solihull. We had a week to prepare a presentation for the final which we presented to a panel of judges made up of high ranking employees of npower.

The final was a very enjoyable day which pro-

vided an interesting look at how the company was run as well as a good opportunity to practice our presentational skills. At the end of the day, we were announced as overall runners-up after the forecasting and presenting, narrowly missing out on the 1000 pounds cash prize. But, despite being initially disappointed on our quest for glory, we have all since been offered summer internships at npower - circumventing the typical recruitment process - which offers a fantastic chance to gain an insight into a large company, increase our employability, and possibly pave the way to a graduate role in the future.

Overall, we feel like this was a very good opportunity to further our mathematical knowledge and a fun task to complete. We would recommend this or any similar challenges to anyone interested in applying their knowledge to real-world situations for both enjoyment and enhancing CVs.

### Enterprising Birmingham Final Showcase – 29th March 2017

Discover how University of Birmingham research is solving real world problems at the Final Showcase of the Enterprising Birmingham Innovation Competition. Three inventive finalists will pitch their ideas to a Dragons' Den style judging panel for a 20,000 pounds investment.

The event on Wednesday 29th March 2017 kicks off with a buffet lunch starting at 12.30pm, before the pitching event at 2.15pm. The awards ceremony at 4.15pm is followed by a wine reception where guests will have the opportunity to network with innovative researchers, alumni, public and private sector partners, funders and investors.

Keynote speakers include Lord Bilimoria of Chelsea, Chancellor of the University of Birmingham and Chairman of Cobra Beer, and Dr Sam Decombel who studied at the University before founding FitnessGenes, a DNA analysis platform which provides a personalised, precision approach to diet and exercise.

Enterprising Birmingham rewards researchers who have identified a commercial opportunity for their research – and the winning entries may well be the commercial success stories of tomorrow. Join us for an inspiring afternoon to celebrate the creativity, entrepreneurial flair and academic endeavour of the University of Birmingham. Reserve your free ticket [here](#).

## Multiscale Biology Study Group

by DAVE SMITH

The School hosted a Multiscale Biology Study Group from 12th-15th December 2016, funded by the Multiscale Biology Network and POEMS (Predictive Modelling for Healthcare Technology through Maths), organised by Sara Jabbari, Rosemary Dyson and Dave Smith. The study group brought together about 50 mathematicians and computer scientists from the UK and abroad to work intensively on problems from biology and healthcare research. The topics studied were: preventing pre-eclampsia in pregnancy, imaging how plant roots grow, immune cell cancer, reconnecting blood vessels in plastic surgery and understanding the permeability of blood vessels.

All of the problem presenters commented on how useful the week had been, and a number of joint projects are expected to follow as a result. The best aspect of the week was the level of enthusiasm and leadership shown by PhD students, who undoubtedly did the majority of the work!

### Dynamics of Antimicrobial Resistance in the Urban Water Cycle in Europe (DAR-WIN)

by SARA JABBARI

The School of Mathematics will be helping to examine the dynamics of antimicrobial resistance in European waste-water treatment works through a grant funded by the Joint Programming Initiative on Antimicrobial Resistance. With partners in the UK, Denmark, Israel and Spain, the large-scale project will seek to unravel how different water treatment systems (primarily those downstream of hospitals) affect the spread of antimicrobial resistance using a combination of mathematical modelling, experimental work and clinical data. Potential intervention strategies will be included in the analysis and thus mathematical modelling will be at the heart of predictions concerning restricting the spread of antibiotic resistance. At Birmingham, the project will be led by Dr Jan-Ulrich Kreft (School of Biosciences), with Sara Jabbari and Dr Iain Johnston (Biosciences) as Co-Is.

## EPSRC funded project in Numerical Analysis

by ALEX BESPALOV

An EPSRC standard grant has been awarded to support research on the project ‘Numerical analysis of adaptive UQ algorithms for PDEs with random inputs’.

This joint project with collaborators at the University of Manchester – Professor David Silvester and Dr Catherine Powell – focuses on the development of robust, accurate, and practical numerical methods for solving parameter-dependent partial differential equations (PDEs) stemming from uncertainty quantification (UQ) models. PDEs are ubiquitous in the mathematical modelling of physical processes in science and engineering. Traditional deterministic PDE-based models assume precise knowledge of all inputs (material properties, initial conditions, external forces, etc.). In practical applications, however, a complete characterisation of all the inputs to a PDE model may not be available. In these applications, simulations based on deterministic models are unable to estimate probabilities of undesirable events and, hence, to perform a reliable risk assessment. The emergent area of UQ relies on probability techniques to describe the models by PDEs with random data, where both inputs and outputs take the form of random fields. Numerical solution of such PDE models is significantly more challenging than the solution of their deterministic analogues.

Numerical methods based on a parametric reformulation of PDE problems with random inputs present more efficient and rapidly converging alternatives to Monte-Carlo sampling in cases where the dimension of the stochastic space is moderate. Recent research into these methods suggests that their advantageous approximation properties can best be achieved by using an adaptive refinement strategy, when spatial and stochastic components of the approximate solution are judiciously chosen in the course of numerical computation. The design of optimal adaptive algorithms remains an open question however. Our project aims at the design, theoretical analysis and efficient implementation of the state-of-the-art adaptive algorithms applicable to a range of PDE problems with random inputs. This research is relevant to many applications in engineer-

ing and manufacturing where improvements in the efficiency and reliability of numerical methods for uncertainty quantification would have a direct impact on public safety. This includes, in particular, the nuclear power industry with a long-standing challenge of managing nuclear waste and minimising the risks of contamination of groundwater.

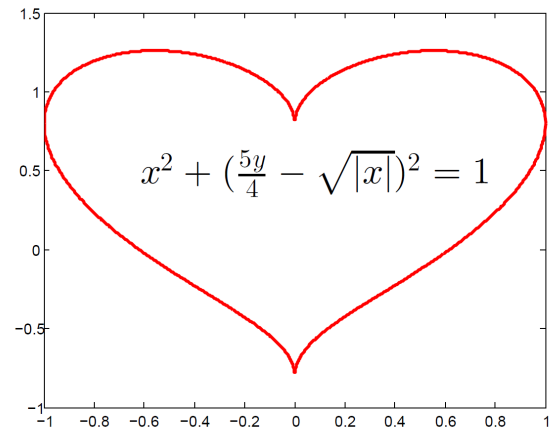
### News in Brief

- Congratulations go to four members of the School for recently being awarded funding by EPSRC. Nikolaos Fountoulakis has been awarded a 3-year EPSRC grant on “Dynamic models of random simplicial complexes”. Yulii Shikmurzaev has been awarded a grant, joint with the University of Warwick, concerning “Darcy-scale dynamics of microscopically fluctuating interfaces”; Natalia Petrovskaya is a co-Investigator on the project. Further, Qianxi Wang has been awarded a grant, which is held jointly with the School of Dentistry, on “Maximising cavitation to clean dental implants”.

David Craven has also recently had his Royal Society University Research Fellowship extended by three years. Congratulations to all!

- In January, Professor Robin Wilson visited Birmingham to give the popular maths lecture to a packed audience. You can watch his lecture on ‘The Story of  $\pi$ ’ [here](#). Also this term Jonathan Meddaugh gave a popular lecture on ‘Origami and Mathematics’ and Allan Lo gave a lecture on ‘Sudoku - a special Latin square’.
- In August the School will be hosting one of the world’s largest Group theory conferences, ‘Group St. Andrews 2017’. The principal speakers are Michael Aschbacher (Caltech), Pierre-Emmanuel Caprace (Université Catholique de Louvain), Radha Kessar (City University, London) and Gunter Malle (TU Kaiserslautern). The other invited speakers are Tim Burness (University of Bristol), Vincent Guirardel (Université de Rennes 1), Harald Helfgott (University of Göttingen), Andrei Jaikin-Zapirain (Universidad Autónoma de Madrid) and Donna Testerman (École Polytechnique Fédérale de Lausanne). See the [conference webpage](#) for more information.

- On June 29-30, the School will host the workshop 'Interactions in Combinatorics'. The invited speakers are Zdeněk Dvořák (Prague), Leslie Ann Goldberg (Oxford), Peter Hegarty (Chalmers University of Technology), Daniel Horsley (Monash), Oleg Pikhurko (Warwick), Oriol Serra (Barcelona), Julia Wolf (Bristol) and Yufei Zhao (Oxford). There will also be chance for participants to give contributed talks. More details of the event are available on the workshop webpage.
- Congratulations to Dave Smith and Rosemary Dyson on their engagement! The happy couple will be getting married this August and we wish them all the best!



*The formula for love*