EST. 1865

## NEWSLETTER

No. 463 November 2016

## LMS RECEIVES PRESTIGIOUS ATHENA PRIZE

The London Mathematical Society (LMS) has won the inaugural Royal Society Athena Prize, which celebrates individuals and organisations that have contributed most to the advancement of diversity in Science, Technology, Engineering and Mathematics (STEM) within their communities. The prize was presented to the LMS at a ceremony at the Royal Society's annual diversity conference on 31 October 2016.
The LMS Women in Mathematics Committee, set up in 1999 to support the advancement of mathematics and improve the gender balance within the mathematics community, has been recognised for introducing a broad range of initiatives in the field of mathematics resulting in a change of culture that has happened nationwide. The award acknowledges the huge amount of energy and commitment to the cause of diversity in mathematics given by many volunteers since the founding of the Women in Mathematics Committee in 1999.
Mathematics has a particularly extreme drop in gender balance across the various academic stages. Although close to $40 \%$ of mathematics undergraduates are female, this drops rapidly at PhD and postdoctoral level. In 1998 only 3\% of professors of mathematics were women. The percentage of female mathematics professors has doubled since the committee was set up, and now stands at around 7\%.
The LMS Women in Mathematics Committee has developed several key initiatives to address the diversity issues within the mathematics community. In 2009 the

LMS introduced a Good Practice Scheme which

THE
ROYAL SOCIETY has helped departments across the UK engage with the challenges of improving diversity. Of the scheme's registered supporter departments, four have now been awarded silver Athena SWAN status and 34 have Athena SWAN bronze status. In 2013 the LMS published a new report, Advancing Women in Mathematics: Good Practice in UK University Departments. The report, which was launched at the House of Commons, raised the profile of gender imbalance in mathematics with policy makers.
The committee also holds Women in Mathematics Days to raise the profile of female mathematicians. The events have grown in popularity across the years, with two events being held in 2016, in Cambridge and Edinburgh, with around 80 delegates attending each event. The events bring together enthusiastic and capable women mathematicians to inspire other women in the field.
Professor Simon Tavaré FRS, LMS President, commented; 'The London Mathematical Society is delighted to have been awarded the Royal Society's first Athena Prize. The award acknowledges the huge amount of energy and commitment to the cause of diversity in mathematics given by many volunteers since the founding of the Women in Mathematics Committee in 1999. The progress made in encouraging more women to pursue the subject and to see its possibilities has been the result of real collaboration and

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London page 13

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teamwork, and the Athena Prize is a wonderful recognition of this.
'Clearly there is some way still to go in closing the gender gap in mathematics. The LMS Women in Mathematics Committee is working towards
broadening its work and hopes also to increase the amount of work it undertakes with younger university students and with school students, to address the problems at the earliest stages of the mathematics people pipeline'.


## LMS MEMBERS RECEIVE MATHS AND COMPUTING AWARDS

On Tuesday 11 October 2016 at Bletchley Park, the MRC Clinical Sciences Centre (CSC) launched an initiative to celebrate women in maths and computing. As a new branch of the existing Suffrage Science scheme it is hoped that the initiative will encourage women into science, and to reach senior leadership roles.


Professor Dame Frances Kirwan (left) and Professor Gwyneth Stallard

The CSC formed the Suffrage Science scheme five years ago. There are currently two sections, one for women in the Life Sciences, and one for those in Engineering and the Physical Sciences. The event at Bletchley Park launched a third specialism, for women in maths and computing. At the launch, 12 women received awards to celebrate their scientific achievements and ability to inspire others.
The LMS is delighted that Professor Dame Frances Kirwan (University of Oxford), former President of the LMS, Professor Gwyneth Stallard (Open University), former Chair of the LMS Women in Mathematics Committee, LMS Member Professor Leslie Ann Goldberg (University of Oxford) and LMS Honorary Member Professor Shafi Goldwasser (MIT) were among the 12 award winners. More information and a complete list of winners are available at http://tinyurl.com/zrd7dve.

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http://newsletter.Ims.ac.uk

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## CLAIRE VOISIN AWARDED CNRS GOLD MEDAL

The London Mathematical Society (LMS) congratulates LMS Honorary Member Claire Voisin, Professor at Collège de France, Paris, on her award of the 2016 CNRS Gold Medal; France's highest scientific distinction. Professor Voisin is a specialist in the field of algebraic geometry. Since it was created in 1954, the CNRS Gold Medal is
awarded annually to scientific figures who have made an exceptional contribution to 'the innovation and influence of French research'. Professor Voisin is only the fourth woman, and first female mathematician, to receive the honour. More information about the award is available at https://news.cnrs.fr/ articles/claire-voisin-2016-cnrs-gold-medal.

## SUCCESS OF OPEN HOUSE CONTINUES

Once again the Society enjoyed a very successful London Open House event on Sunday 18 September 2016, with over 300 visitors. Since first participating in Open House six years ago nearly 2,000 people have visited De Morgan House, learning about the Society and mathematics more generally.
Visitors were given a flavour of the architectural features of De Morgan House and those who may have lived in the premises over the years, as well as the building's place in the rich and diverse history of Bloomsbury, through
a short tour of selected rooms by LMS staff and Open House volunteers. The event was also an opportunity to publicise LMS activities and, this year as well as enjoying a presentation about the history of the Society, visitors had the opportunity to watch Thinking Space, a film commissioned by the Society as part of its 150th Anniversary celebrations in 2015. The film comprises a series of interviews with nine UK-based mathematicians. Short extracts from the film are available on the LMS website at www.Ims.ac.uk/library/frames-of-mind.

## 2016 ELECTIONS TO COUNCIL AND NOMINATING COMMITTEE

Members should now have received a communication from the Electoral Reform Society (ERS) for both e-voting and paper ballot. For online voting, members may cast a vote by going to www.votebyinternet.com/LMS2016 and using the two part security code on the email sent by the ERS and also on their ballot paper.
All members are asked to look out for communication from the ERS. We hope that as many members as possible will cast their vote. If you have not received ballot material, please contact duncan.turton@lms.ac.uk, confirming the address (post or email) to which you would like material sent.
With respect to the election itself, there are twelve candidates proposed for six vacancies for Member-at-Large. One candidate has been
nominated for the role of Librarian (Member-at-Large). Six candidates have been proposed for four vacancies in the membership of Nominating Committee. The slates and candidate biographies for the election can be found on the LMS website at www.Ims.ac.uk/about/ council/Ims-elections. Candidates have been nominated for all officer positions
For both electronic and postal voting the deadline for receipt of votes is Thursday 3 November 2016. Members may still cast a vote in person at the AGM, although an in-person vote must be cast via a paper ballot.
Members may like to note that a LMS Election forum, moderated by the Scrutineers, can be found at http://discussions.Ims.ac.uk/ elections2016.

## Future Elections

Members are invited to make suggestions for nominees for future election to Council. These should be addressed to the Nominating Committee (nominations@lms.ac.uk). Members
may also make direct nominations: details will be published in the March 2017 Newsletter or are available from Duncan Turton at the LMS (duncan.turton@lms.ac.uk).

Fiona Nixon, Executive Secretary

## EUROPEAN WOMEN IN MATHEMATICS

## Membership

The London Mathematical Society is pleased to announce that LMS Members who are also Members of European Women in Mathematics (EWM) may now pay for membership of EWM when renewing their membership of the London Mathematical Society.
Founded in 1986, EWM is an international association of women working in the field of mathematics in Europe. For more information on EWM activities please visit www.europeanwomeninmaths.org.
LMS Members who wish to join EWM should first register at www.europeanwomeninmaths. org/about-us/membership and may then choose to pay their EWM membership via the LMS when renewing their LMS membership. Contrary to previous information provided, it is not possible to join the EWM through the LMS.
There are three categories of EWM fees:

1. Low fees (currently $£ 4.00$ ) for students, unemployed, or professional mathematicians from low income countries.
2. Standard fees (currently $£ 17.00$ ).
3. High fees (currently $£ 42.00$ ) for members who wish and are able to support more EWM activities.
You decide yourself your category of fees: high, normal, low.
If you choose to pay for membership of EWM via the LMS, please indicate your category of fee either on your online membership record under the 'Journal Subscription' tab or on the LMS subscription form.
You can access your LMS membership record here: www.Ims.ac.uk/user.
The LMS will notify EWM of those members who have paid their EWM fees through the LMS.

## ANNUAL LMS SUBSCRIPTION 2016-17

Members are reminded that their annual subscription, including payment for publications, for the period November 2016 - October 2017 due on 1 November 2016 should be paid no later than 1 December 2016.
In September, the Society sent a reminder to all members to renew their subscription for 2016-17. If you have not received a reminder, please email membership@lms.ac.uk.
Members can now view and pay their membership subscriptions online via the Society's website: https://www.lms.ac.uk/user.
Further information about subscription rates for 2016-17 and a subscription form may also be found on the Society's website: www.

Ims.ac.uk/content/paying-your-subscription.
The Society encourages payment by direct debit. If you do not already pay by this method and would like to set up a direct debit (this requires a UK bank account), please set up a direct debit to the Society with GoCardless.com via your online membership record: https://www.lms.ac.uk/user.
The Society also accepts payment by cheque and credit or debit card. Please note card payments are now accepted online only and can be made via your online membership record: https://www.lms.ac.uk/user.

Elizabeth Fisher
Membership \& Activities Officer

## ANNUAL GENERAL MEETING

The Annual General Meeting of the Society will be held at 3.00 pm on Friday 11 November 2016 at BMA House, Tavistock Square, London WC1H 9JP. The business shall be:

1. Elections to Council and Nominating Committee
2. Review of Society Activities 2015-16
3. Report of the Treasurer
4. Resolutions
a. Adoption of the Trustees' Report 2015-16
b. Appointment of the Auditors
5. Presentation of Certificates to the 2016 LMS Prize Winners
It is hoped that as many members as possible will be able to attend. The AGM will be followed by a Society Meeting at which Professor S. Jon Chapman (Oxford) will give the Naylor Lecture. Also speaking will be Professor Alan Champneys (Bristol). See page 13 for further details.

Fiona Nixon,
Executive Secretary

## NEWS FOR EARLY CAREER RESEARCHERS AND STUDENTS

## PhD STUDENTS

Date for your diary:
11 November 2016
Join us for the next LMS Graduate Student Meeting at BMA House London. Speakers include Chris Howls (Southampton) and Philippe Trinh (Oxford) plus graduate students talks. Further details available online: www.Ims. ac.uk/events/society-meetings.

## MASTERS STUDENTS

## Dates for your diary:

11 November 2016
Join us for the next LMS Graduate Student Meeting at BMA House London. Speakers include Chris Howls (Southampton) and Philippe Trinh (Oxford) plus graduate students talks. Further details available online: www.Ims. ac.uk/events/society-meetings.

## 16-17 December 2016

The next LMS Prospects in Mathematics Meeting will be held in York. Further details
will be available in due course and online: www. Ims.ac.uk/events/lms-prospects-mathematicsmeeting. Deadline to apply: 11 November 2016.

## UNDERGRADUATES

Funding for Undergraduate Society Meetings Funds of up to $£ 500$ are available to support meetings of Undergraduate Mathematical Societies to cover the travel and accommodation costs for an invited speaker (from academia or industry) and to cover catering costs e.g. a wine reception after the meeting. Further information and an application form is available online: www.lms.ac.uk/grants/LMS-Funding-Undergrad-Soc-Meetings. Next application deadline: 30 November 2016.

## Date for your diary:

16-17 December 2016
The next LMS Prospects in Mathematics Meeting will be held in York. Further details will be available in due course and online: www. Ims.ac.uk/events/Ims-prospects-mathematicsmeeting. Deadline to apply: 11 November 2016.


LONDON MATHEMATICAL SOCIETY
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## SOUTH WEST \& SOUTH WALES REGIONAL MEETING

## BATH

Tuesday 20 December 2016
2.15-2.30 Welcome
2.30-3.30 Professor Simon Donaldson FRS
3.30-4.00 Coffee break
4.00-5.00 Professor Carlos Conca
(Universidade de Chile)
An inverse problem in biological alfoctory cilum
$5.00-6.30 \quad$ Wine reception
7.00 Dinner at Woods Restaurant

These lectures are aimed at a general mathematical audience. All interested, whether LMS members or not, are most weicome to attend this event.
For further details and to register and to reserve a place at the dinner, please visit go.bath.ac.uk/ms2016/ The cost of the dinner will be approximately $£ 40$ including wine.
The meeting forms part of two regional workshops on New Developments at the Interface between Geometry and Physics (19-20 December 2016) and Partially Ordered Materials - Mathematical Perspectives and Challenges (21 December 2016). For further details contact the organisers Johannes Nordström, Apala Majumdar and Jonathan Dawes at en.ritchie@bath.ac.uk.
There are funds available to contribute in part to the expenses of members of the Society or research students to attend the meeting and workshop. Requests for support, including an estimate of expenses, may be addressed to the organisers.

## SOCIETY CONFERENCE GRANTS

The Society is pleased to report that in 2015-16, awards totalling $£ 266,819$ were made in the support of mathematics conferences. Funds are granted to the organisers of conferences to be held in the United Kingdom, and may be used to cover the expenses of principal speakers, and to provide support for research
students and for participants from Scheme 5 or former Soviet Union countries. For Postgraduate Research Conferences, funds are granted to support speakers and participants. Applicants wishing to apply for funding for a conference will find further details on the Society's website at www.Ims.ac.uk/content/research-grants.

Conference grants awarded during 2015-16

| Conference | Dates, Place | Applicant | Grant |
| :--- | :--- | :--- | :--- |
| Classic and Stochastic Geometric <br> Mechanics | 4-8 January 2016, <br> Imperial College <br> London | D. Holm <br> M. Bruveris | $£ 5,000$ |
| Interactions between Algebra, <br> Coding Theory and Cryptography | 5 January 2016, <br> Durham | A. Stasinski | $£ 1,918$ |
| Lancaster Bandits | $11-12$ January 2016, <br> Lancaster | S. Grunewalder | $£ 5,500$ |
| From Symbolic Dynamics <br> to Approximation Methods | 5 February 2016, <br> King's College London | M. Crochemore <br> R. Mercas | $£ 1,070$ |
| Why be Noncommutative? | 8 February 2016, <br> Imperial College <br> London | T. Schedler | $£ 600$ |
| Algebraisation and Geometri- <br> sation in the Langlands <br> Programme | 29 March - 1 April <br> 2016, Bristol | T. Oliver | $£ 6,000$ |
| Singularities and Applications: <br> Victor Goryunov 60 | 30 March - 1 April <br> 2016, Liverpool | P.J. Giblin | $£ 7,000$ |
| Explicit Methods in Number <br> Theory | 4-8 April 2016, <br> Warwick | S. Siksek | $£ 6,000$ |
| Mathematics Emerging: A <br> Tribute to Jackie Stedall and <br> Her Influence on the History of <br> Mathematics | 9-10 April 2016, <br> Oxford | P. Neumann | $£ 4,000$ |
| Probabilistic Combinatorics: Cel- <br> ebrating Colin McDiarmid's Work | 9-10 April 2016, <br> Oxford | S. Gerke | $£ 6,000$ |
| Point Processes and Warping <br> Functions with Statistical <br> Applications | 20 April 2016, <br> Nottingham | K. Bharath | $£ 600$ |
| Hilbert's Sixth Problem | 2-4 May 2016, <br> Leicester | A. Gorban | $£ 5,400$ |
| Two Linked One-Day Colloquia in <br> Combinatorics | $11-12$ May 2016, <br> Queen Mary University <br> of London and LSE | J. Skokan | $£ 5,000$ |
|  |  |  |  |


| Conference | Dates, Place | Applicant | Grant |
| :---: | :---: | :---: | :---: |
| Operators, Operator Families and Asymptotics | 16-19 May 2016, Bath | K. Cherednichenko | £6,795 |
| Gregynog Wales Mathematics Colloquium 2016 | 23-25 May 2016, Gregynog Hall, Powys | S. Cox | £1,759 |
| Young Applied Analysts in the UK | $\begin{aligned} & \text { 26-27 May 2016, } \\ & \text { Bath } \end{aligned}$ | L. Scardia | £4,000 |
| One Day Meeting in Combinatorics | 1 June 2016, Oxford | A. Scott | £2,450 |
| $p$-adic L-functions Day | 1 June 2016, Cambridge | G. Rosso | £3,200 |
| Computational and Analytic Problems in Spectral Theory Workshop | 6-9 June 2016, Cardiff | I. Wood | £6,560 |
| Quantum Physics and Logic | 6-10 June 2016, Strathclyde | C. Heunen | £2,000 |
| Fourth Scottish Partial Differential Equation Colloquium | 9-10 June 2016, Dundee | I. Kyza <br> M. Ptashnyk | £4,375 |
| Interactions of Operator Theory with Quantum Processes | 10 June 2016, Newcastle | E. Kakariadis | £600 |
| Integrable Models, Conformal Field Theory and Related Topics UK Meeting | 10-11 June 2016, King's College London | G. Watts | £2,045 |
| Group Actions and Algebraic Combinatorics | 11-15 June 2016 Herstmonceux Castle | R.J. Shank | £6,000 |
| Directions in Stochastic Networks | 13 June 2016, Manchester | N. Walton | £530 |
| Recent Advances in Discontinuous Galerkin Methods | 13 June 2016, Reading | A. Moiola | £1,300 |
| Celebrating the New Probability Group at Lancaster University | 15-16 June 2016, Lancaster | D. Korshunov <br> D. Zeindler | £1,200 |
| Random Interacting Systems Workshop and School | 19-24 June 2016, Bath | A. de Oliveria Stauffer | £6,600 |
| New Trends in Nonlinear PDEs: From Theory to Applications | 20-24 June 2016, Cardiff | N.P. Dirr | £6,000 |
| Representation of Quantum Groups and Cherednik Algebras | 24 June 2016, Newcastle | M. Balagovic | £600 |
| PDE Software Frameworks 2016 | 4-8 July 2016, Warwick | A.S. Dedner | £4,500 |
| The Stone-Cech Compactification: Theory and Applications | 6-8 July 2016, Cambridge | I. Leader | £7,000 |


| Conference | Dates, Place | Applicant | Grant |
| :---: | :---: | :---: | :---: |
| Mathematical Communication During The Cold War | 8 July 2016, Oxford | C. Hollings | £605 |
| Mathematical and Theoretical Biology European Conference | 11-15 July 2016, Nottingham | J. King | £7,000 |
| Representation Theory of Algebraic Groups: A Conference in Honour of Stephen Donkin | 13-15 July 2016, York | H. Geranios | £6,000 |
| Representation Theory and Physics Workshop | 18-22 July 2016, Leeds | A.E. Parker | £6,000 |
| Topology and its Applications 31st Summer Conference | 2-5 August 2016, Leicester | S. Paoli | £6,000 |
| Geometry and Physics: Graded Geometry and Applications to Physics | 8-12 August 2016, Sheffield | M. Jotz-Lean | £7,000 |
| British Topology Meeting | 29-31 August 2016, Glasgow | B. Owens | £6,000 |
| Invariant Subspaces and Banach Algebras - In Memory of Charles Read | 1-2 September 2016, Leeds | J.R. Partington | £5,000 |
| Kronecker Coefficients 2016 | 5-9 September 2016, City University London | C. Bowman | £2,500 |
| The 100th Transpennine Topology Triangle Meeting | 6-7 September 2016, Manchester | N. Ray | £1,485 |
| British Logic Colloquium 2016, with Plotkin Day 9 September 2016 | 6-9 September 2016, Edinburgh | M. Fourman | £3,500 |
| O-Minimality and Diophantine Geometry, One Day Meeting | 7 September 2016, Manchester | G. Jones | £600 |
| Hitchin70 | 9-11 September 2016, Oxford | F. Kirwan | £5,930 |
| Stochastic Analysis Conference in Honour of István Gyöngy's 65th Birthday | 11-12 September 2016, Edinburgh | D. Siska | £6,000 |
| Function Theory Meeting | 12 September 2016, De Morgan House (London) | I. Short | £1,700 |
| Geometric Models of Nuclear Matter Conference | 12-16 September 2016, Kent | S. Krusch | £4,700 |
| Random Matrix Theory: Perspectives and Applications | 13 September 2016, Kent | A. Deano-Cabrera | £600 |
| Mathematical Biography - A Celebration of Mactutor | 16-17 September 2016, St Andrews | I.J. Falconer | £5,710 |


| Conference | Dates, Place | Applicant | Grant |
| :--- | :--- | :--- | :--- |
| Topics in SDEs and their Links to <br> (S)PDEs | 19-23 September 2016, <br> Leeds | E. Issoglio | $£ 595$ |
| Representation and Homology | 22 September 2016, <br> East Anglia University | J. Grant | $£ 596$ |
| Mathematics in the Regions: Staff <br> Tutor Research | 13-14 October 2016, <br> Open University | R. Brignall | $£ 600$ |
| Topological Dynamical Systems <br> and Operator Algebras | 2 December 2016, <br> Glasgow | M. Whittaker | $£ 600$ |
| Random Matrix Theory and <br> Applications Brunel-Bielefeld <br> Workshop | 9-10 December 2016, <br> Brunel | D. Savin | $£ 4,245$ |
| New Horizons in Twistor Theory | 4-7 January 2017, Oxford | L. Mason | $£ 6,000$ |
| Singularities, Symmetries and <br> Submanifolds (18th UK-Japan <br> Winter School in Mathematics) | 4-7 January 2017, <br> University College <br> London | J.D. Evans | $£ 4,000$ |
| T-time Meeting | 12 January 2017, <br> Manchester | H. Suess | $£ 600$ |
| British Applied Mathematics <br> Colloquium 2017 | 10-12 April 2017, <br> Surrey | A. Skeldon | $£ 6,000$ |
| 26th British Combinatorial Con- <br> ference | $3-7$ July 2017, <br> Strathclyde | S. Kitaev | $£ 7,000$ |
| BSDEs, SPDEs and their Applica- <br> tions International Workshop | 3-8 July 2017, <br> Edinburgh | G. dos Reis | $£ 6,650$ |
| Mathematical Models in Ecology <br> and Evolution 2017 | 10-12 July 2017, City <br> University London | M. Broom | $£ 4,000$ |

Postgraduate Research Conference grants awarded during 2015-16

| Conference | Dates, Place | Applicant | Grant |
| :--- | :--- | :--- | :--- |
| Young Functional Analysts' <br> Workshop | $6-8$ April 2016, <br> Queen's University <br> Belfast | I. Todorov | $£ 4,000$ |
| Early Career Stage Topologists at <br> Imperial College | 13-14 June 2016, <br> Imperial College <br> London | A. Corti <br> M. Marengon | $£ 4,000$ |
| Postgraduate Group Theory <br> Conference | 28 June - 1 July 2016, <br> Imperial College London | M. Liebeck <br> A. Malcom | $£ 4,000$ |
| Quantum Roundabout | 6-8 July 2016, <br> Nottingham | G. Adesso <br> R. Nichols <br> P.L. Scorpo <br> B. Regula | $£ 4,000$ |
| Student Symposium on <br> Mathematical Foundations in <br> Bioinformatics | 15 July 2016, King's <br> College London | M. Crochemore <br> F. Vayani | $£ 4,000$ |
| Galway Topology Colloquium | 1 August 2016, <br> Leicester | A. Clark <br> P. Staynova, D. Rust | $£ 4,000$ |
| Young Researchers in <br> Mathematics 2016 | 1-4 August 2016, <br> St Andrews | T. Neukirch <br> T. Bourne | $£ 4,000$ |



LONDON MATHEMATICAL SOCIETY
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## LMS ANNUAL GENERAL MEETING

Friday II November
BMA House, Tavistock Square, London WCIH 7JP
Programme - Annual General Meeting, Black Suite
15.00 Opening of the Meeting \& Society Business
15.30 Alan R. Champneys (Bristol)

Bumps, blips and bulges; the theory of localised pattern formation
16.30 Coffee/Tea
16.55 Election results

I7.00 S. Jon Chapman (Oxford) - Naylor Lecture
Asymptotics beyond all orders: the devil's invention?
18.00 Close of meeting

I8.15 Wine reception at BMA House, Paget Suite
The meeting will include the presentation of certificates to all 2016 LMS prizewinners.
The meeting will be followed by a reception as well as the Society's Annual Dinner, which will also be held at BMA House.
For further details about the AGM, please contact Elizabeth Fisher (Imsmeetings@lms.ac.uk).

The cost to attend the dinner is $£ 53$ per person. To book, please email Carol Chessis by Friday 28th October: AnnualDinner_RSVP@Ims.ac.uk


This meeting is intended as an introduction to the Society Meeting later in the day. All graduate students (and indeed any other mathematicians) are very welcome.
Speakers: Dr Philippe Trinh (Oxford) The Role of Exponentially Small Effects in Fluid Mechanics and Professor Chris J. Howls (Southampton) Sum-ware Over the Rainbow: How Exponential Asymptotics Betters Poincaré.

Student talks ( 6 slots available)
Students are invited to give short talks ( 15 minutes) aimed at a general mathematical audience. Prizes will be awarded for the best two talks. If you would like to give a talk, please email Anthony Byrne (Imsmeetings@lms.ac.uk) by 21 October.
Travel grants
Travel grants of up to $£ 50$ are available for students who attend both the Graduate Student Meeting and the LMS General Meeting.

LMS General Meeting and Naylor Lecture, II November 2016, I5:00-I8:00, BMA House
The LMS General Meeting is a Society Meeting, which is open to all.
Alan R. Champneys (Bristol) Bumps, blips and bulges; the theory of localised pattern formation
S. Jon Chapman (Oxford), Naylor Lecturer, will give the 2016 Naylor Lecture: Asymptotics beyond all Orders:The Devil's Invention?
After the Society Meeting, there will be a reception at BMA House.
For further details see: http://www.Ims.ac.uk/content/society-meetings
To register, please email Imsmeetings@lms.ac.uk by I November. Places are free and all refreshments including lunch will be provided.

## MATHEMATICS POLICY ROUND-UP

## November 2016

## HIGHER EDUCATION

## Teaching Excellence Framework

The government has published details of how universities will be rated under the second year of the Teaching Excellence Framework (TEF). Documents available at http://tinyurl. com/hruwzjc. The government has also published the following documents.

- Teaching Excellence Framework: year two technical consultation responses. This summarises the feedback received from the sector in response to the technical consultation and demonstrates how the government has responded: http://tinyurl. com/zc5r6dz
- Review into the data sources for TEF metrics. A review by the Office for National Statistics of the quality of the data sources used for TEF: http://tinyurl.com/j2rcc6d.
- Research into the factors that affect highly skilled employment outcomes. A report of analysis carried out to improve the quality of the benchmarking for highly skilled employment metric: http://tinyurl.com/ hlwcbxu.


## Brexit impact on higher education

The House of Commons Education Select Committee has launched an inquiry into the impact of Brexit on higher education. The Committee invites written submissions on the following issues.

- The likely impact of the UK exiting the EU on EU students studying in England.
- What protections should be in place for existing EU students and staff?
- The future of the Erasmus+ programme following the withdrawal of the UK from the EU.
- Risks and opportunities for UK students.
- How changes to freedom of movement rules may affect students and academics in English higher education institutions.
- How to ensure UK universities remain competitive after the withdrawal of the

UK from the EU.

- What the Government's priorities should be during negotiations for the UK to exit the EU with regard to students and staff at higher education institutions?
- What steps the Government should take to mitigate any possible risks and take advantage of any opportunities?
The deadline for submissions is 11 November

2016. More information is available at http:// tinyurl.com/zuxehee.

## SCHOOLS AND COLLEGES

How the top grades will be awarded in new GCSEs
In 2017 grades are changing from A* to G to 9 to 1 for English language, English literature and mathematics GCSEs. Other subjects will follow in the coming years. More information is available at http://tinyurl.com/h6w93tb.

## Post-16 mathematics pathways

There are important changes happening in post-16 mathematics. This includes the Smith Review into the feasibility of compulsory mathematics study. The Review is led by Professor Sir Adrian Smith, Vice-Chancellor, University of London and Chair of the Council for the Mathematical Sciences (CMS), and will report to the Treasury and the Department for Education by the end of 2016.
The aim of the review is to consider the potential for improving the nature and scale of the study of mathematics from 16 to 18 , and ensure that the future workforce has the appropriate mathematical and quantitative skills. The Advisory Committee on Mathematics Education (ACME) response to the Smith Review is available at http://tinyurl.com/ h2jn25n.

## Technology, career pathways and the gender pay gap

Deloitte has recently published a report Women in STEM Technology, career pathways and the gender pay gap. Although
the gender pay gap is closing incrementally, pay parity between men and women in the UK is not forecast to be achieved until 2069. Significantly, the gap in starting salary between men and women who have
 studied STEM subjects and go on to take jobs in those areas is smaller than in any other subjects studied.
The analysis of employment data from the past 15 years alongside nearly three million university records finds that women make up just 14.4 per cent of individuals working in STEM occupations in the UK with as many as 70 per cent of women with STEM qualifications not working in relevant industries. Women are more likely than men to pursue studies - and subsequently take up employment - in caring or teaching roles. Key findings:

- Although the gender pay gap is closing steadily, the forecast is that at the current rate of convergence, pay parity will not be achieved until 2069.
- Overall, almost as many girls as boys sat GCSEs in STEM subjects this year (2016), outperforming them in every subject except maths.
- At A-Level in 2016, 40 per cent more boys than girls took STEM subjects. However, girls continued to outperform boys in every STEM subject
- Many top-paid jobs increasingly call for ability in STEM subjects
- Research shows that in the past 15 years, both men and women have benefited from technology-driven changes in the labour market. Moreover, the impact of technology on jobs undertaken by men and women is fairly balanced.
According to the report, 'this clear divide in the skills between genders needs to be addressed so that all students - whether male or female and at all stages of their education - are provided with an equal foundation upon
which they can build the career of their choice'. The full report is available at http:// tinyurl.com/ze7c5el.


## ACME Conference Report

The 2016 ACME Conference Influences and Impact: Policies for High-Quality Mathematics Education, was held at the Royal Society in July. The 150 delegates were made up of classroom teachers and senior leaders, academics in mathematics education, policy makers, representatives from industry and others with an interest in mathematical education. A report from the conference, summarising the key messages from the keynote presentations, panel session and workshops is available at http://tinyurl.com/ jy97r4o.

## OTHER

## Risks and opportunities following Brexit vote

The Science Council hosted a Summit in September 2016 to identify the risks and opportunities to professional bodies posed by Brexit.
The Summit was attended by 40 organisations representing higher education, the charitable sector, learned societies and professional bodies in science. It provided attendees with the opportunity to hear from a range of experts about the current knowns and unknowns of the process of Brexit, and how professional bodies can best influence the negotiations. More information is available at http://tinyurl.com/z52heel.

## New Science Council President



Vice-Chancellor of the University of Sheffield, Professor Sir Keith Burnett is to become Science Council President. Before moving to Sheffield, Professor Sir Keith was Head of the Division of Mathematical, Physical and Life Sciences at the University of Oxford. Prior to that he was

## Chairman of Physics at Oxford.

His academic career started in Colorado in the US, as a research associate at the Joint Institute for Laboratory Astrophysics, he went on to become an assistant professor in the Department of Physics at the University of Colorado. He was a lecturer in the Physics

Department at Imperial College London for four years before returning to Oxford in 1987 as a lecturer in Physics and Fellow of St John's College. More information is available at http://tinyurl.com/zyshn7t.

Dr John Johnston
Joint Promotion of Mathematics

## EDINBURGH MATHEMATICAL SOCIETY

Along with the Institute of Mathematics and its Applications, the London Mathematical Society, the Operational Research Society and the Royal Statistical Society, the Edinburgh Mathematical Society (EMS) is a member of the Council for the Mathematical Sciences. The Edinburgh Mathematical Society was founded in 1883 to provide its members, the majority of whom were schoolteachers, with lectures on advanced mathematics. It has evolved over many years and has become established as the principal mathematical society for the university community in Scotland. The aims of the Society are the promotion of the mathematical sciences, traditionally both pure and applied, particu-


Sir Edmund Whittaker
larly in Scotland. Its

## Edinburgh Mathematical Society

 membership comes from all the Scottish universities and other educational institutions as well as from mathematicians in industry and commerce both at home and overseas. It is also very much concerned with the encouragement of Mathematical Sciences PhD students at Scottish universities.Each year the Edinburgh Mathematical Society has a programme of about eight or nine lectures in Edinburgh and around Scotland. One of these lectures takes the form of a popular lecture and is accessible to school pupils in the their final years at school.
Apart from the General Committee, two other committees provide outreach. The Research Committee supports individuals and conferences. Indeed the authors of this note acknowledge the generous support and encouragement of the Edinburgh Mathematical Society for the Groups St Andrews series of conferences. The Education Committee provides some muchappreciated support for the Schools Enrichment Fund. Among other activities it supports Mathematical Challenge, a problem solving competition for individual pupils in Scottish schools. It also supports activities such as school mathematics clubs and a residential study weekend for Higher/Credit level pupils for three schools from disadvantaged areas of Scotland.
Another important activity of the Society is the Proceedings of the Edinburgh Mathematical Society. The Proceedings date back to 1884. It contains research papers on topics in a broad range of pure and applied mathematics, together with a number of topical book reviews.

Every four years the Whittaker prize, named after Sir Edmund Whittaker formerly Professor of Mathematics at the University of Edinburgh, is awarded to a leading mathematician with Scottish connections. Whittaker was President of the Edinburgh Mathematical Society in 1914-15 and President of the London Mathematical Society in 1928-29. For many years from 1913 to 2003 there was a series of summer colloquia, the St Andrews Colloquia, which were held in St Andrews from 1926 at roughly four-yearly intervals. The St Andrews Fund is now used to support an annual postgraduate meeting at the Burn, Edzell.
The Edinburgh Mathematical Society celebrated its centenary in 1983 and there were also special events in 2008 for one hundred and twenty-five years of the Society.
As well as some joint meetings with the London Mathematical Society, the Edinburgh

Mathematical Society held a joint meeting with the Catalan Mathematical Society in 2015. In Scotland the Society has strong links with ICMS, the International Centre for Mathematical Sciences, in Edinburgh.
For those interested in the history of the Society two interesting articles are M. Hartveit, Death of a Schoolmaster, European Math. Society Newsletter, Issue 74 (2009), 27-30 and R.A. Rankin, The First Hundred Years (18831983), Proc. Edinburgh Math. Soc. (2) 26 (1983), no. 2, 135-150. This and other historical information is also available at the MacTutor website www-history.mcs.st-and.ac.uk/Societies/EMS. html.
Further information about the Society and membership of the Society is available at www. ems.ac.uk.

Colin M. Campbell, Edmund F. Robertson
University of St Andrews

## EUROPEAN NEWS

The following items are from the European Mathematical Society (EMS) webpage www. euro-math-soc.eu/news.

## Leicester University, UK

The EMS is very concerned learning about plans for staff reductions at the Department of Mathematics at Leicester University, UK.* Due to a challenging financial situation, the university's administration has put forward plans to dismiss $5 \%$ of the university's staff. Mathematics, however, is supposed to be hit overproportionally hard: 21 staff members have been told that they must re-apply for their jobs, with only 15 posts to be filled again (plus one university teacher post) - and that although Leicester mathematics has a fine reputation within both research and teaching. In accord with letters from the London Mathematical Society and from leading British research mathematicians, the European Mathematical Society has urged the vice chancellor at Leicester University to stop the implementation of the plans for staff dismissal and to enter into consulta-
tions with the British mathematical community. For further information see http://tinyurl.com/ h2ae47l.

## IMU Officers

The Adhering Organizations and Committees for Mathematics within the International Mathematical Union (IMU) are now invited to submit names for the offices of the IMU President and the IMU Secretary for the next term 2019-2022.
Submissions must include a candidate's statement of willingness to serve if elected and a CV (strict maximum two pages). Only electronic submissions are accepted. Nominations should be sent by 15 January 2017 to Martin Grötschel (chair@nc18.mathunion.org) using the official email address of the Adhering Organization or Committee for Mathematics.

David Chillingworth
LMS/EMS Correspondent

[^2]
## Cambrimas <br> ICHRNAL日

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## compositio.nl/\#foundation

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## BHARGAV BHATT AWARDED COMPOSITIO PRIZE

Every three years, the Foundation Compositio Mathematica awards a prize for the best paper published in Compositio Mathematica in a preceding three-year period. The winner of the Compositio Prize for the period 2011-2013 is the paper by Bhargav Bhatt, ‘Derived splinters in positive characteristic', Compositio Mathematica 148 (2012) no. 6, 1757-1786.
The prize will be awarded on 9 December 2016 during a festive day in Amsterdam, with lectures by the authors of all nominated papers.
Besides the winning paper by Bhargav Bhatt, two other papers were nominated for the prize: D. Kotschick and S. Schreieder, 'The Hodge ring of Kähler manifolds', Compositio Mathematica 149 (2013) no. 4, 637-657; and June Huh, 'The maximum likelihood degree of a very affine variety', Compositio Mathematica 149 (2013) no. 8, 1245-1266.

Bhatt's paper is motivated by Hochster's direct summand conjecture, which has tantalized commutative algebraists for about forty years. The conjecture is that if $R$ is a subring of a ring $S$ with $R$ regular and $S$ finitely generated as an $R$-module, then the inclusion
of $R$ into $S$ has an $R$-linear splitting.
In 1973, Hochster settled the case where $R$ contains a field. The open case was therefore the arithmetic case, where $R$ has mixed characteristic. It turns out that the direct summand conjecture is connected with an array of other conjectures in commutative algebra.
Bhatt's paper asks to what extent the direct summand conjecture generalizes to non-regular rings $R$. Namely, define a ring $R$ to be a splinter if every inclusion of $R$ into a ring $S$ with $S$ finite over $R$ has an $R$-linear splitting. Using a variant notion of derived splinters (defined using derived categories), Bhatt is able to relate splinters to various types of 'F-singularities', a naturally arising class of mild singularities in characteristic $p$.
The paper has contributed to several further developments. Most spectacularly, André Hochster's direct summand conjecture. Bhatt immediately gave a simpler proof, partly using the idea of derived splinters. Both papers appeared on the arXiv in August 2016. Burt Totaro UCLA

## ADVERTISE IN THE LMS NEWSLETTER

To advertise in this LMS Newsletter contact Susan Oakes (susan.oakes@Ims.ac.uk). LMS Newsletter rates (plus VAT where applicable):

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Further details, including format and dimensions, are at: http://newsletter.Ims.ac.uk/rate-card/


## LONDON MATHEMATICAL SOCIETY <br> EST. 1865

## CECIL KING TRAVEL SCHOLARSHIP

The London Mathematical Society annually awards a $£ 5,000$ Cecil King Travel Scholarship in Mathematics, to a young mathematician of outstanding promise. The Scholarship is awarded to support a period of study or research abroad, typically for a period of three months. Study or research in all areas of mathematics is eligible for the award.

The award is competitive and based on a written proposal describing the intended programme of study or research abroad, and the benefits to be gained from such a visit. A shortlist of applicants will be selected for an interview during which they will be expected to make a short presentation on their proposal.

Applicants must be nationals of the UK or the Republic of Ireland, either registered for or having completed a doctoral degree within 12 months of the closing date.

Applications should be made using the form available on the Society's website (https://www.Ims.ac.uk/prizes/cecil-king-travel-scholarship) or by contacting education@lms.ac.uk. The closing date for applications is Friday 31 March 2017. It is expected that interviews will take place in London in late May or early June.

The Cecil King Travel Scholarship was established in 2001 by the Cecil King Memorial Fund. The award is made by the Council of the London Mathematical Society on the recommendation of the Cecil King Prize Committee, nominated by the Society's Research Meetings Committee.

The London Mathematical Society is a registered charity for the promotion of mathematical knowledge.

## LMS HARDY LECTURESHIP TOUR 2018

## Nominations Sought



LONDON MATHEMATICAL SOCIETY
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The Society is seeking nominations for a Hardy Lecture Tour in 2018.
The Hardy Lecturer visits the UK for a period of about two weeks, and gives the Hardy Lecture at a Society meeting, normally held in London in late June or early July. The Hardy Lecturer will also give at least six other lectures, on different topics, at other venues in the UK.

The schedule is decided by the Programme Secretary in consultation with the Hardy Lecturer, and will be designed to allow as many UK mathematicians as possible to benefit from the Hardy Lecturer's presence in the UK.

The holder of the Hardy Lectureship shall be a mathematician who has not been normally resident in the United Kingdom of Great Britain and Northern Ireland for a period of at least five years, at the time of the award. Grounds for the award of the Lectureship include:

- the achievements of the Hardy Lecturer,
- including work in, influence on, and general service to mathematics; lecturing gifts; and breadth of mathematical interests;
- the overall benefit the UK mathematical community might derive from the visit;
- the possibility of bringing to the UK a mathematician who might otherwise visit rarely or never.

The Hardy Lectureship is not restricted to mathematicians working in any specific area of math-
 ematics.

Previous lecturers include: 2016 Jacob Lurie (Harvard), 2015 Nalini Joshi (Sydney), 2014 Percy Deift (NYU), 2012 Etienne Ghys (Lyon).

The London Mathematical Society will fund:

- the honorarium - $£ 2,000$ paid directly to the Hardy Lecturer.
- travel expenses (including travel to/from the UK and within the UK) . up to $£ 2,500$
- accommodation expenses . up to $£ 1,500$
- a contribution to the host department to hold a dinner for the Hardy Lecturer/Hardy Lecturer. up to $£ 100$ per institution.

The host department(s) will be expected to provide office accommodation and the academic support normally offered to a distinguished visitor.

Nominations must have the support of the host department(s), and should be sent by the Head of Department to the Programme Secretary (Imsmeetings@lms.ac.uk). The closing date for proposals is 31 January 2017.

For further details and guidance on how to submit a nomination, please visit the Society's website: www.Ims.ac.uk/events/lectures/hardy-lectureship

## LMS MIDLANDS REGIONAL MEETING AND WORKSHOP

Report

The LMS Midlands Regional Meeting and Workshop on Interactions of Harmonic Analysis and Operator Theory was hosted by the School of Mathematics at the University of Birmingham from 13 to 16 September 2016. The event examined recent exciting interactions between harmonic analysis and operator theory at the forefront of applications to partial differential equations across a variety of geometric contexts. More than 65 mathematicians took part, ranging from UK based undergraduates with a burgeoning aspiration for research to internationally renowned research leaders. The event had a distinct international flavour with almost half the participants based outside the UK; many arrived from a number of European countries as well as Australia and Japan.
The Workshop featured two mini-courses by Kaj Nyström (Uppsala, Sweden) and Javier Parcet (ICMAT, Spain). These distinguished speakers provided incredibly wellmotivated, enthusiastic and detailed accounts of recent developments in the theory of "parabolic equations with complex bounded measurable coefficients" and "Fourier Lp summability with frequencies in nonabelian groups", respectively. The mini-
courses were aimed at a level accessible by doctoral students and provided an effective introduction to recent interactions between harmonic analysis and operator theory for early career researchers, whilst stimulating the interest and insight of


Kaj Nyström (Uppsala, Sweden) analysts more generally. Indeed, more than one third of the participants were research students, with most based in the UK receiving financial support from the LMS.
The Workshop included a further ten expert plenary talks covering a broad selection of topics at the interface between harmonic analysis and operator theory. These included functional calculi, analysis on Lie groups, Euclidean and noncommutative harmonic


Javier Parcet (ICMAT, Spain) analysis, first-order methods in elliptic and parabolic PDEs, multilinear inequalities, optimal constants and weighted estimates. The talks allowed researchers to delve deeper into exciting recent developments with many commenting on the novelty and effectiveness of bringing together such a diverse range of topics that would foster potential future interactions.
The LMS Regional Meeting took place on the afternoon
of 15 September 2016. Pascal Auscher (Paris-Sud, France) delivered a moving tribute to the mathematical legacy of Alan McIntosh, Charles Batty (Oxford) articulated a comprehensive overview of the preservation of holomorphic semigroups, and Tony Carbery (Edinburgh) presented an intriguing multilinear analogue of duality. The Meeting was opened by LMS Vice President John Greenlees and was followed by a wine reception and the Society dinner at Browns Birmingham restaurant in the city centre, which was favoured with delightful autumn weather as participants enjoyed views of St. Martin in the Bull Ring.


Participants of the LMS Midlands Regional Meeting pose outside the Great Hall at the University of Birmingham

The event's poster and programme together with the list of registered participants, abstracts and slides of the talks are available from the website http://web.mat.bham.ac.uk/Imsmidlands2016/.

Alessio Martini, Andrew Morris
University of Birmingham

## RECORDS OF PROCEEDINGS AT LMS MEETINGS

## ORDINARY MEETING, 15 SEPTEMBER 2016

held at the Watson Building, University of Birmingham, as part of the Midlands Regional Meeting and Workshop on Interactions of Harmonic Analysis and Operator Theory. Over 60 members and guests were present for all or part of the meeting.
The meeting began at 1.15 pm with The Vice-President, Professor John Greenlees, in the Chair.
There were no members elected to Membership at this Society Meeting.
Two members signed the Member's Book and were admitted to the Society.
Professor Jon Bennett, Head of the Analysis Group at the University of Birmingham, introduced the first lecture given by Professor Pascal Auscher of Université Paris-Sud on Some mathematical legacy of Alan McIntosh.
Professor Bennett then introduced the second lecture given by Professor Charles Batty of the University of Oxford on Holomorphic functions which preserve holomorphic semigroups.
After tea, Professor Bennett introduced the final lecture by Professor Tony Carbery of the University of Edinburgh on Multilinear duality.
Professor Greenlees thanked the speakers for their excellent lectures. Professor Greenlees then expressed the thanks of the Society to the organisers, Dr Alessio Martini and Dr Andrew Morris, both of the University of Birmingham, for a wonderful meeting and workshop.
Afterwards, a wine reception and dinner were held at the Brown's Restaurant in Birmingham.

# STOCHASTIC ANALYSIS CONFERENCE IN HONOUR OF ISTVÁN GYÖNGY'S 65TH BIRTHDAY 

## Report

The research conference on Stochastic Analysis in honour of István Gyöngy's 65th birthday took place at the School of Mathematics, University of Edinburgh from 10 to 12 September 2016. The conference provided a good overview of recent advances in mathematical areas broadly relating to Stochastic Analysis.
The conference was well attended with over 40 participants and eight invited speakers. The invited speakers each delivered 45 minute talks. There were seven contributed talks delivered by early career researchers. The topics of talks spanned recent results on nonlinear stochastic partial differential equations in the framework of regularity structures, the via theory of rough paths and their application
applications of stochastic filters in epileptic seizure detection, to probabilistic descriptions of the distributions of prime numbers. The titles and abstracts of all talks are available at the conference website: www.ed.ac.uk/ maths/conference-on-stochastic-analysis-edin-burgh-2016.

Among the highlights of the event were the very successful open problem session and the well-attended conference dinner held in St Leonard's Hall. The conference brought together three "generations" of mathematicians with Professor István Gyöngy, his former advisor Professor Nicolai Krylov, as well as five former students of Professor István Gyöngy all attending.
The broad range of interesting topics brought lively discussion between the participants during the various coffee breaks and as far as the organisers are aware, several new collaborative projects were started or advanced during the conference.
The organisers gratefully acknowledge support of the Edinburgh Mathematical Society, the London Mathematical Society, the Royal Society, the Maxwell Institute and the Maxwell Institute Graduate School in Analysis and its Applications.

Sotirios Sabanis (Edinburgh)
David Siska (Edinburgh)
Miklós Rásonyi (Budapest)


## GEOMETRIC MODELS OF NUCLEAR MATTER CONFERENCE

## Report

The second Geometric Models of Nuclear Matter conference took place from 12 to 15 September 2016. In total about 40 researchers from the UK, Italy, Spain, Poland, Germany, Greece and Japan attended the conference. The participants were an exciting mix of worldleading experts, earlier career researchers and postgraduate students. This was specifically engineered to effectively disseminate current research and to help advance the careers of junior researchers.
The conference was mainly concerned with Skyrmions, which are localised, stable, finite energy solutions of a field theory called the Skyrme model. The conference witnessed the latest developments on how these Skyrmions can model nuclear matter, to give new physical insights. Key topics included an application of deep concepts in the geometry of four manifolds to physical quantum numbers, how to modify the Skyrme model to better model experimental nuclear binding energies, and a novel method to quantise Skyrmion vibrations, which has led to the Skyrme model replicating
nuclear spectra that were previously not theoretically observed.
Conference talks were limited to 30 minutes with an additional 10 minutes of question time. This format worked very well as it encouraged discussion and gave many participants the opportunity to speak. It also allowed time for informal discussion. One main success of this conference was the interdisciplinary engagement of the nuclear physics community. The last day of the conference featured two Skyrmion talks, four nuclear physics talks, and a lively discussion and concluding remarks session led by Professor Nick Manton. Titles and abstracts of all talks can be found on the conference website at www.kent.ac.uk/smsas/ personal/skyrmions/GMNMC2016.html.
The conference was kindly supported by the London Mathematical Society (Scheme 1 Conference grant), the loP Mathematical and Theoretical Physics Group and the IoP Nuclear Physics Group.

Steffen Krusch University of Kent


Attendees

## LMS INVITED LECTURER 2017 Professor Jim Agler (UCSD) <br> Function Theory by Hilbert Space Methods <br> 18-22 April 2017, Herschel Building, Newcastle University

Our topic will be a powerful machinery that has been developed in the last 60 years both to discover and to prove theorems about analytic functions in one and several complex variables through the construction of operators on Hilbert space.
The lectures will begin with expositions of the elementary operator theory that is required to achieve interesting results in function theory.
Next we will show how a number of classical results in the theory of analytic functions in one variable, when cast in a Hilbert space setting, can be proved by operator-theoretic methods which are largely algebraic in nature. These results will include the Herglotz Representation Theorem, the Carathéodory and Pick Interpolation Theorems, Nevanlinna's Representation Theorems, the Car-athéodory-Julia Theorems, and Loewner's Theorem.
The remainder of the talks will focus on how the operator-theoretic proofs of these one- variable theorems can be generalized to yield a variety of new results in several complex variables.

## Guest Lectures

There will also be supplementary lectures by:
Professor John McCarthy (Washington University in St. Louis, USA)
Research interests:Analysis, especially Operator Theory and one/several Complex Variables
Associate Professor Greg Knese (Washington University in St. Louis, USA)
Research interests: Complex Function Theory, Operators, Harmonic Analysis
Assistant Professor Kelly Bickel (Bucknell University, Lewisburg, PA, USA)
Research interests: Multivariate Operator Theory, Several Complex Variables, Harmonic Analysis

## Accommodation, Travel Funding and Registration

Accommodation will be provided at the Osborne Hotel.
Limited financial support is available with preference given to UK research students. Please contact the organiser for further details: Zinaida Lykova zinaida.lykova@newcastle.ac.uk. Deadline for funding: I April 2017. http://www.mas.ncl.ac.uk/~nek29/Imslectures2017/function_theory.html


LONDON MATHEMATICAL SOCIETY<br>EST. 1865

## LMS PRIZES 2017 CALL FOR NOMINATIONS

The London Mathematical Society welcomes nominations for the 2017 prizes, to recognise and celebrate achievements in and contributions to mathematics.
In 2017, the LMS Council expects to award:
PÓLYA PRIZE is awarded in recognition of outstanding creativity in, imaginative exposition of, or distinguished contribution to, mathematics within the United Kingdom.
SHEPHARD PRIZE is awarded to a mathematician or mathematicians for making a contribution to mathematics with a strong intuitive component which can be explained to those with little or no knowledge of university mathematics, though the work itself may involve more advanced ideas.
SENIOR WHITEHEAD PRIZE - grounds for the award may include work in, influence on or service to mathematics, or recognition of lecturing gifts in the field of mathematics
NAYLOR PRIZE AND LECTURESHIP IN APPLIED MATHEMATICS - grounds for the award may include work in, and influence on, and contributions to applied mathematics and/or the applications of mathematics, and lecturing gifts.
SENIOR ANNE BENNETT PRIZE - grounds for the award are work in, influence on or service to mathematics, particularly in relation to advancing the careers of women in mathematics.
WHITEHEAD PRIZES - for work in and influence on mathematics.
BERWICK PRIZE is awarded to the author(s) of a definite piece of research actually published by the Society during the eight years ending on 31 December 2016.

For further information and nomination forms, please visit the LMS website (www. Ims.ac.uk/content/nominations-Ims-prizes) or contact Duncan Turton, Secretary to the Prizes Committee at the Society (tel: 0207927 0801, email: prizes@lms.ac.uk).
The Prizes Committee is keen to increase the number of nominations it receives and, in particular, the number of nominations for women, which are disproportionately low each year. The prize regulations refer to the concept of 'academic age'-rather than date of birth-in order to take account more fully of broken career patterns.

## Closing date for nominations:

TUESDAY 24 JANUARY 2017

## THE ORIGINS OF NUMERICAL ABILITIES

The Origins of Numerical Abilities scientific discussion meeting will be held at the Royal Society, London from 20 to 21 February 2017. The scientific organisers are Professor Brian Butterworth FBA, Professor Charles Gallistel and Professor Giorgio Vallortigara.
Humans possess numerical abilities and have invented cultural tools to use them efficiently; but many other creatures, from insects to primates, have in the past decade been found to possess numerical abilities, possibly descended from a common ancestral form. Therefore, when we acquire numerical competence, for example in school, we build upon a specific inherited cognitive foundation. This meeting will discuss the underlying cognitive functions involved in the use of numbers, and the implications of these discoveries in mathematical education and language acquisition.
There will be a poster session at 17:00 on Monday 20 February. If you would like to present a poster you are invited to submit an abstract for consideration by the scientific organisers. The abstract should be no more than 200 words, and should make clear the title, your name, your institution and the author list. You may only submit an abstract for consideration if you are registered to attend the meeting. Please submit your poster abstract by 9 December to discussion.meetings@royalsociety.org.
Royal Society scientific discussion meetings aim to provide a platform for leaders in the field, as well as early career scientists, to meet for networking and discussion. More information on the speakers and programme can be found on the website: http://tinyurl.com/haml5fy.
This meeting is followed by a related meeting The Origins of Numerical Abilities:

The Future to be held at the Royal Society at Chicheley Hall from 22 to 23 February 2017. Attendance at this meeting is at the discretion of the scientific organisers. More information can be found at http://tinyurl. com/h4junp5.

## BRITISH MATHEMATICAL COLLOQUIUM 2017

The British Mathematical Colloquium 2017 is to be held at Durham University from 3 to 6 April. The plenary speakers will be:

- Eva Bayer-Fluckiger (EPFL)
- Kenji Fukaya (Kyoto/Simons Centre)
- Isabelle Gallagher (Paris-Diderot)
- Laurent Lafforgue (IHÉS)
- Jacob Lurie (Harvard)
- George Lusztig (MIT)

A public lecture will be given by Noam Elkies (Harvard University). There will be 12 morning talks, and workshops will be held in the areas of Algebra, Analysis, Geometry, Number Theory and Topology. For more information and to register, please visit the website www.maths.dur.ac.uk/bmc2017/.
The BMC 2017 is supported by an LMS Conference grant, the Heilbronn Institute and the Foundation Compositio Mathematica.

## T-TIME

T-time: one-day meeting on toric methods in algebra and geometry will be held on 12 January 2017 in the Alan Turing Building at the University of Manchester, with talks starting at 13:00. Speakers include:

- Milena Hering (Edinburgh)
- Alexander Kasprzyk (Nottingham)
- Hendrik Süß (Manchester)

Anyone interested is welcome to attend. Some limited funds may be available to contribute to the expenses of research students who wish to attend the meeting. Further details can be obtained from the web page http://suess.sdf-eu.org/website/ttime.php. The meeting is supported by an LMS Conference grant.

## BRITISH APPLIED MATHEMATICS COLLOQUIUM 2017

The 59th British Applied Mathematics Colloquium (BAMC) will be held at the University of Surrey from 10 to 12 April 2017. In the best tradition of the BAMC, the meeting will provide a forum for networking and for both early career and more experienced researchers to present their work across a broad range of applied mathematics. Following the usual format, the meeting will include plenary speakers, minisymposia, submitted talks and posters. Abstract submission and registration will open at the beginning of December.
This year's plenary speakers are: Ingrid Daubechies (Duke), Pete Grindrod (Oxford), Rebecca Hoyle (Southampton), Karen Willcox (MIT), Beth Wingate (Exeter).
The organizers are David Lloyd, Ian Roulstone and Anne Skeldon. Further information can be found on the conference website: www.surrey.ac.uk/maths/bamc.
The meeting is supported by an LMS Conference grant and the Institute for Mathematics and its Applications (IMA).

## SINGULARITIES, SYMMETRIES AND SUBMANIFOLDS

The 18th UK-Japan Winter School in Mathematics on Singularities, Symmetries and Submanifolds will take place from 4 to 7 January 2017 at University College London. The topic this year is the interface between symplectic topology and geometric analysis, including mirror symmetry and calibrated submanifolds. The Winter School provides a forum for both young and established researchers, particularly from the UK and Japan, to meet, exchange ideas and to learn about current developments in an active area of mathematics from leading experts in the field.
There will be three minicourses, a variety of research talks and a poster session for PhD
students to present their work. The minicourses will be suitable for graduate students and the speakers will be:

- Dominic Joyce (Oxford)
- Ailsa Keating (Columbia/Cambridge)
- Kazushi Ueda (Tokyo)

Speakers for research talks include: C. Bellettini, S. Donaldson, K. Hattori, H. Iriyeh, K. Krasnov, Y. Lekili, R. Miyaoka, T. Nishinou, K. Ono and A. Ritter.
Registration is now open with a deadline of 1 December. To register, or for more detailed information, see the website: www. homepages.ucl.ac.uk/~ucahjde/ukjap/index. htm.
The Winter School is being organised by Jonny Evans, Akito Futaki, Jason Lotay, Reiko Miyaoka and Yoshihiro Ohnita. It is supported by an LMS Conference grant.

## NEW HORIZONS IN TWISTOR THEORY

A meeting on Twistor Theory and Related Areas will take place in the Mathematical Institute Oxford from 4 to 6 January 2017 to take stock of twistor theory at 50 years of age and to look forward to future developments and applications. It will also be an opportunity to celebrate the contributions of Roger Penrose at 85 and Nick Woodhouse at 67.
The preliminary list of speakers is: Tim Adamo, Nima Arkani-Hamed, Nathan Berkovits, Mike Eastwood, Yvonne Geyer, Nigel Hitchin, Claude LeBrun, Katharina Neusser, Roger Penrose, Michael Singer, Paul Tod, Anastasia Volovich and Richard Ward.
Some accommodation is available at Somerville College and will need to be booked by 20 November. Registration will be open until 30 November. The organizers are: Maciej Dunajski, Lionel Mason, Dave Skinner and Florence Tsou. More information can be found at www.maths.ox.ac.uk/groups/math-ematical-physics/events/twistors50 including contact and registration details.
The meeting is supported by an LMS Conference grant and the EPSRC.

## ONE HUNDRED PRISONERS AND A LIGHT BULB

by Hans van Ditmarsch and Barteld Kooi, illustrations by Elancheziyan, Springer, 2015, pp 188, 24 illus, £11.99, ISBN 978-3319166940.

For a time in the spring of 2015 the puzzle of Cheryl's birthday attracted almost the same level of internet exposure that the black and blue, or perhaps white and gold, dress had gathered a few months earlier. In this problem, supposedly given to pri-mary-level children in Singapore, we are told that Cheryl gives each of her friends Albert and Bernard separately some information about the date of her birthday, together with a list of ten possible dates, one of which is correct. Initially neither can deduce which of the dates is the birthday, but after each tells the other whether or not they know, both are now able to decide the correct birthday. (If you didn't see the puzzle at the time, you can find it, with Alex Bellos's discussion, in the Guardian at http://tinyurl.com/ zhkoovl).
Such problems are tricky because the solution requires thinking about what each person knows about what the others know. Another example, taken from the book under review, presents three people, each of whom has a number written on their forehead (so nobody can see their own number). They all know that one of the numbers is the sum of the other two. Anne, Bill and Cath each say in turn that they do not know their number. Now Anne is able to say that she knows that her number is 50 . What are the other

numbers?
This book, translated from the Dutch original, presents eleven problems of this kind, and develops the theory of dynamic epistemic logic to show how they can be solved. The puzzles, and book, are fun. They lead us into discussion of coding (the title problem essentially requires 100 pieces of information to be transmitted through a channel offering only one bit) and gossip protocols (how many phone calls between a number of people are needed for everyone to know every piece of gossip, and how many before everyone knows that everyone knows?)
I was delighted to find that my favourite childhood game Cluedo (the US version is called Clue) gets a chapter to itself, and even more to learn about the Dutch PhD defence which involved a giant public game of Cluedo to find the "murderer" of the distinguished historian of mathematics Jan van Maanen.
If occasionally I felt that the theory makes slightly heavy weather of some of the problems, overall this is an illuminating and entertaining account of these puzzles (and tells us something of their history). If you enjoyed Cheryl's birthday puzzle, you will like this book.

Tony Mann
University of Greenwhich

## COMBINATORICS: A VERY SHORT INTRODUCTION

by Robin Wilson, Oxford University Press, 2016, pp 176, £7.99, ISBN 978-0198723493.

Let's play a game, the rules are very simple: I give you a topic for which you are the author of A Very Short Introduction. Now your task is to give me three subjects that MUST be included, on pain of serious reviewer disapproval. So, for example, I say 'cheese', you say 'cheddar, roquefort and toasties'; I say 'sharks', you say 'teeth, JAWS, and being underappreciated'; I say 'combinatorics', you say 'counting, graphs, and Erdős'.... Or do you?

It seems churlish to start a review of Combinatorics: A Very Short Introduction by complaining about an omission. Of course, there are omissions, it's a consequence of being "very short"! But, still, to omit any reference whatsoever to undoubtedly the most charismatic figure in combinatorics for the last 100 years seems a serious oversight: 1525 papers (and counting); 511 collaborators; umpteen theorems, methods, questions, conjectures; whole new mathematical vistas; a whole new mathematical lifestyle! What more did Erdős need to do?
Enough. We'll revisit omissions a little later, but what of the material that DOES warrant inclusion here? Much of it is, in fact, very pleasing. After a brief introduction, the first chapter of this book is devoted to the 'four types of problem' that one typically encounters in combinatorics: existence, construction, enumeration and optimization. A good sample of problems of each type are discussed, and their importance highlighted. This 'bird's eye view' of a combinatorialists' work was new to me, and I found it aesthetically very

satisfying; it is also an excellent entry point to the ensuing exposition of combinatorics.
This introductory chapter is followed up by a discussion of permutations and combinatorics, and the various formulae required for selecting a fixed number of items from a fixed set. Again, one has a neat decomposition of this fundamental combinatorial task into subcategories, each with their own beauty: one selects with repetition but neglecting order; or with repetition and with order; etc. Again, the discussion is clear, includes some interesting examples, and is well-chosen for allowing a newcomer to the subject to 'settle in' quickly to the subject its basic concerns.
There is an unfortunate misprint in this chapter - in the statement of 'Combinatorial Rule 2', a rule that is referred to several times subsequently. Indeed, the book has been compromised in several places by poor proofreading; perhaps, most notably, in the chapter on graphs when the author uses a 'fact' (that every connected plane graph has a face bounded by at most 5 edges) to prove a weak version of the 4 -colour theorem. The presence of such erroneous facts is particularly problematic given that the book is targeted at an audience that is not mathematically-sophisticated, and for whom such inaccuracies can present an insurmountable obstacle to understanding.
Still, for the most part, the remainder of the book is uncontroversial, cleanly written, and makes for an enjoyable read. One thing that
slightly irked me is the prevalence of Eng-lish-specific mathematics in the discussion of modern combinatorics -- many of the classical references are standard and very international (the Luoshu magic square from China, the tilings of Pappus, the towers of Hanoi, even up to the more modern work of Leibniz and Euler), but once the book reaches the 19th century, examples seem distinctly skewed towards the preoccupations and work of English combinatorialists.
At first glance, perhaps, this seems fine and logical - the book is written by an English man, published by an English publisher, and (apparently) aimed at an English readership. Still, the presence of such a national bias made me realise how much I appreciate the fact that in my professional life as a mathematician, the material that I read is entirely blind to such matters. When doing mathematics, I care about ideas and concepts for which
relevance, and what a privilege this is. As Hilbert wrote, 'mathematics knows no races or geographic boundaries; for mathematics the cultural world is one country'.

Perhaps this explains why Erdős doesn't get a mention in this book (nor, indeed, does any Hungarian except Pólya, who is mentioned in an aside), and perhaps this is OK - the author needs to engage his audience and one way
to do this is to talk about mathematics that is close to home. I can't help but feel, though, that it might have been possible some other way. For example, the stand-out moment for me reading this book was when I learnt that the Ramsey number $R(5,5)$ is only known to lie somewhere between 43 and 49 . Such a 'simple' problem, and yet so difficult! Combinatorics is littered with such easily-stated open problems, and these could have been exploited much more effectively in this volume methinks.
The particular problem just mentioned - on $R(5,5)$ - allows me to end this review with a brief Erdős anecdote, just to show what the readers missed. The quote is from Spencer. [1]
> "Erdős asks us to imagine an alien force, vastly more powerful than us, landing on Earth and demanding the value of $\mathrm{R}(5$, 5) or they will destroy our planet. In that case, he claims, we should marshal all our computers and all our mathematicians and attempt to find the value. But suppose, instead, that they ask for $R(6,6)$. In that case, he believes, we should attempt to destroy the aliens."

Nick Gill
University of South Wales
[1] Joel H. Spencer (1994), Ten Lectures on the Probabilistic Method, SIAM, p 4.

## BASIC DISCRETE MATHEMATICS LOGIC, SET THEORY, \& PROBABILITY

by Richard Kohar, World Scientific, 2016, pp 732, pb £65.00, ISBN
978-9813147546, hb £123.00, ISBN 978.9814730396.

Basic Discrete Mathematics is an excellent general basic textbook in Discrete Mathematics and Probability. This book's raison d'ętre is to provide a hands-on textbook with enough pictures and diagrams to appeal to visual learners and make logic, set theory and probability more accessible.
The front cover of the book is clear, elegant and interesting, setting the tone for the rest of the book. This is an ideal text for the first year of undergraduate study in discrete mathematics. It will appeal to both specialists
and non-mathematicians. The book is clearly set out with introductory worked examples. It answers the question why by providing reasons for any statement or formula which is stated. In the preface, Richard Kohar explains how the idea for this book came about when he was charged with the task of teaching mathematics to a class of humanities students and he tried unsuccessfully to find textbooks with explanations as well as theory.
The book acts as a gentle guide which encourages the reader to explore further. There
are historic and humorous elements in the text which make it a riveting, informative read.
All topics are developed from a base level and have enough detail to encourage the reader to try the exercises. All the exercises have worked answers so the reader can check their answers, but also see whether they are on the right track and what they need to do to successfully complete each chapter.
There are plenty of standard examples but many more examples which are current or personal to the author. This makes the reader feel that the book is a work of care written by someone who takes a pride in their work; not just a cut and paste version of several books or websites. I especially enjoyed the references to the television series Yes, Prime Minister, and the book The Hitch Hiker's Guide to the Galaxy by Douglas Adams. The author uses examples which are based in the US, Canada and the UK.
This book goes that little bit further than other introductory texts, but builds gradually
with a steady pace so that the reader is not left feeling lost. For example, there are many books which cover Venn diagrams drawn for three sets, but this book starts with a Venn diagram with just one set within the universal set and then develops to use a Venn diagram with four sets. No knowledge is assumed with new notation being explained before it is used (some of it was new to me and I've been teaching mathematics for over 20 years!)
I found the chapter on infinity especially interesting and well written. It is difficult to understand the concept of countability but here there are excellent diagrams allowing the reader to visualise one-

## CONFERENCE FACILITIES

De Morgan House offers a $40 \%$ discount on room hire to all mathematical charities and 20\% to all not-for-profit organisations. Support the LMS by booking your next London event with us.


# UNIVERSITY ofyork <br>  <br> LONDON MATHEMATICAL SOCIETY EST. 1865 

## 16-17 December 2016

## Department of Mathematics, University of York, <br> Heslington, York YO10 5DD, UK.



University of York

All Finalists Maths Undergraduates, who are considering applying for a Maths PhD in 2017, are invited to attend the 2016 LMS Prospects in Mathematics Meeting.

The meeting will feature a range of speakers from a wide range of mathematical fields across the UK who will discuss their current research and what opportunities are available to you:

Statistics, Probability and Finance

- Martin Hairer (University of Warwick)

Stochastic analysis and Probability

- Vicky Henderson (University of Warwick) Mathematical Finance
- Julie Wilson (University of York) Applications of Statistics
- Alastair Young (Imperial College) Statistical Methodology
Applied Mathematics and Mathematical Physics
- Mark Chaplain (University of Dundee)

Mathematical Biology and Theoretical Ecology

- Ruth Gregory (Durham University)

General Relativity and Cosmology

- Tim Spiller, (University of York) Quantum Physics and Quantum Information
- Sarah Waters (University of Oxford) Fluid Dynamics


## Pure Mathematics

- Victor Beresnevich (University of York) Analytic Number Theory
- Peter Cameron (University of St Andrews) Algebra and Combinatorics
- Tony Carbery (University of Edinburgh) Harmonic Analysis and PDEs
- Katrin Leschke (University of Leicester) Geometry


## 50 places are available, including overnight accommodation and some funding towards travel costs.

To apply: Please email Claire Farrar/Linda Elvin (math515@york.ac.uk); headed Prospects 2016 Application with the statement: "I am on track academically to begin Ph.D. studies in 2017" with evidence of your predicted degree classification.

Application deadline is Friday 11 November 2016. Late application will be considered at the organisers' discretion .

## 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.Ims.ac.uk/content/calendar). Please send updates and corrections to calendar@ Ims.ac.uk.

## NOVEMBER 2016

3 Probabilistic Formal Analysis of Software Usage Styles in the Wild, BCS-FACS Evening Seminar, London (462)
7-10 Statistical Modelling of Scientific Evidence INI Workshop, Cambridge (460)
11 LMS Graduate Student Meeting, London (463)

11 LMS AGM, London (463)
28-2 Dec Advances in Ergodic Theory, Hyperbolic Dynamics \& Statistical Law Workshop, ANU, Canberra (461)

## DECEMBER 2016

2 Topological Dynamical Systems and Operator Algebras Workshop, Glasgow (462)
3 Scottish Operator Algebra Research Meeting, Glasgow (462)
3 BSHM Christmas Meeting, BMI, Birmingham (461)

5-8 Australian Mathematical Society Annual Meeting, ANU, Canberra (461)
5-9 New Developments in Data Privacy INI
Workshop, Cambridge (460)
9-10 Random Matrix Theory Brunel-Bielefeld Workshop, Brunel (461)
9-13 Nonlinear and Geometric Partial Differential Equations Workshop, ANU, Canberra (461)
12-16 Dynamic Networks INI Workshop, Cambridge (460)
16-17 LMS Prospects in Mathematics Meeting, York (463)
20 LMS South West \& South Wales Regional Meeting, Bath (463)

## JANUARY 2017

4-6 Twistor Theory and Related Areas, Oxford (463)

4-7 Mathematics on Singularities, Symmetries and Submanifolds UK-Japan Winter School, University College London (463)
12 T-time Meeting, Manchester (463)
23-27 Structure of Operator Algebras:
Subfactors and Fusion Categories INI
Workshop, Cambridge (461)

## FEBRUARY 2017

20-21 Origins of Numerical Abilities Royal Society Scientific Discussion Royal Society London (463)

## MARCH 2017

22 Christopher Zeeman Medal Lecture, London (462)

## APRIL 2017

3-6 BMC, Durham (463)
10-12 BAMC, Surrey (463)
18-22 Function Theory by Hilbert Space
Methods, Jim Alger, LMS Invited Lecturer, Newcastle (463)

## MAY 2017

5 Mary Cartwright Lecture, London

## JULY 2017

3-7 BSDEs, SPDEs and their Applications Workshop, Edinburgh
3-7 British Combinatorial Conference, Strathclyde
10-12 Mathematical Models in Ecology and Evolution Conference, City, University of London (462)
10-19 Foundations of Computational
Mathematics Conference, Barcelona (461)

## SEPTEMBER 2017

10-15 Mathematics Education for the Future Decade, Balatonfüred, Hungary (460)

## LONDON OPEN HOUSE

## De Morgan House on Sunday 18 September 2016

See article on page 4


Visitors enjoy refreshments before a tour of the building


The building tour visits a number of rooms in De Morgan House


Visitors are informed about the Society's past-Presidents


Visitors sign-up for a tour of De Morgan House


A brief history of De Morgan House is explained during a tour


The members' room has mathematical displays of historical interest


[^0]:    - 20 December: SW \& South Wales Regional Meeting, Bath page 7
    - 18-22 April 2017: LMS Invited Lectures, Newcastle page 26
    - 5 May 2017: Mary Cartwright Lecture, London

[^1]:    Administrative Editor S.M. Oakes
    (newsletter@lms.ac.uk)
    Typeset by the LMS at De Morgan House; printed by Holbrooks Printers Ltd.

[^2]:    *Editor's note: The LMS is attempting to engage in a dialogue with the University of Leicester and therefore is not making a public statement at this time.

