



LONDON
MATHEMATICAL
SOCIETY
EST. 1865

ANNUAL REVIEW

2016–2017



WELCOME FROM THE PRESIDENT



My second year as President of the LMS has gone by all too quickly. We began the year with a strategic retreat of Council at which we discussed, inter alia, ways of making Council meetings more effective.

This has led to some small changes in the way Council business is conducted that should allow more time for strategic discussion about our mathematical activities. We are also exploring electronic decision making and hope shortly to have video-conferencing equipment installed in one of the meeting rooms.

In May, Dr Richard Golding generously hosted the LMS Spring Reception at which Sir John Kingman, son of our 65th President, gave an update on the development of UKRI, and Professor Philip Bond, a member of the Council for Science and Technology, outlined plans for the review of knowledge exchange in the mathematical sciences, emphasising the many ways the mathematical sciences contribute to the nation.

We have continued our engagement with the EPSRC on the thorny issue of support for PhD studentships, and we responded to the EPSRC Knowledge Exchange Consultation by providing a detailed assessment of how the LMS contributes to Knowledge Exchange in the UK. The Education Committee has responded to several consultation requests, and we look forward to working with the newly reconstituted Advisory Committee on Mathematics Education (ACME), funded primarily by the Royal Society and chaired by Professor Frank Kelly.

One of the major themes of the LMS is supporting regional meetings and conferences around the UK. I attended a mathscon event in London in February, as part of a panel including Alex Bellos, Xue-Mei Li and Richard Thomas charged with discussing

“how to make more people love mathematics”. In March, Rob Eastaway gave a most entertaining Zeeman Medal lecture and the LMS held a society meeting at the BMC in Durham at which Isabelle Gallagher described recent progress on Hilbert’s Sixth Problem in her talk “From particle systems to fluid mechanics”.

Prior to the General Meeting in June, Dame Mary Archer hosted Council for a special private tour of the new mathematics exhibition at the Science Museum. The General Meeting itself featured talks by Sheehan Olver and Council’s Gwyneth Stallard, and the election of Étienne Ghys and Persi Diaconis as Honorary Members.

Mathematics lost one of its stars with the premature death of Maryam Mirzakhani, an Honorary Member of the LMS who in 2014 became the first woman to win the Fields Medal. Caroline Series has provided an overview of Professor Mirzakhani’s work in the October edition of *Mathematics Today*.

I will close by thanking the LMS membership, and particularly Council, for their support over the last two years. I have, of course, relied on Fiona Nixon and her team for help and advice on many aspects of the Society’s business, and I thank them for their selfless contributions to our society. Finally, my thanks to everyone who has contributed to the LMS committees and editorial boards that ensure we engage effectively in supporting mathematics and mathematicians across the UK. I leave the LMS in the capable hands of the incoming President, Professor Caroline Series, and look forward to seeing the LMS go from strength to strength.

Simon Tavaré.

Professor Simon Tavaré FRS FMedSci
President, London Mathematical Society

ABOUT THE LMS

The London Mathematical Society (LMS) is the UK's learned society for mathematics. Its purpose is the advancement, dissemination and promotion of mathematical knowledge, both nationally and internationally. The Society receives its resources through publishing, investments, membership fees and endowments. Providing funding in support of mathematics is the primary mechanism through which the Society achieves its charitable aims. Such activities are vital for the continued health of mathematics as a discipline, which is critical to the UK economy and which impacts on a wide range of societal activities.

Governance

The Society is in the process of reviewing its governance arrangements on a number of levels. One important change that has been implemented in 2016-17, and that will take effect in 2017-18, is a review of the committee structure. Three new Committees have been formed – Early Career Research (Chair: Professor Chris Parker, University of Birmingham) Society Lectures and Meetings (Chair: Professor Iain A. Stewart, Durham University), and Research Grants (Chair: Dr Francis Clarke, Swansea University), with two Committees – Programme and Research Meetings – being disbanded. The new committees will cover the work of the former committees and the new structure will enable stronger strategic focus on these three key areas.

Highlighting Success

The Society has continued to develop a range of activities and projects throughout the year aimed at providing resources and expertise that are beneficial to the Mathematical Sciences community. In particular the Society has undergone a restructuring of its Publications area to develop a robust and forward looking strategy, with its main partners John Wiley & Sons and Cambridge University Press.

The Society has also developed what it hopes will be the largest Directory of Mathematical Scientists in the UK, providing an invaluable resource for Mathematical Scientists within academia and industry, and across all the Mathematical Sciences, providing a network of contacts to encourage collaboration.

Another major project in 2016-17 was the redesign of the LMS Newsletter. The first issue was published in September 2017, with a more modern design and exciting new mathematical features, articles and content.



LMS PUBLICATIONS LOOKS TO THE FUTURE



The London Mathematical Society has been a publisher of academic content since the first issue of the *Proceedings of the London Mathematical Society* back in 1865. Currently the Society publishes twelve journals across mathematics, seven of which are in partnership with other learned societies and institutions, two book series and a number of individual book titles.

The process of reviewing the Society's publications was continued in January 2017 when a two-day Publications Strategic Retreat was held, convened by the Publications Secretary. The participants included members of Publications Committee joined by representatives from Council, the Editorial Boards of the Society's journals, the wider mathematics community and external publishing experts.

The objective of the Retreat was to stimulate discussions on all aspects of the LMS publishing operations and to identify priorities for the work of Publications Committee, whose remit is to maintain and develop the LMS's position as a publisher of high-quality mathematics and to monitor how the Society's publications are performing within the context of the wider scholarly communication landscape.

The LMS publishes a range of core mathematics journals in partnership with John Wiley & Sons

The discussions were many and wide-ranging covering such issues as changes in publishing business models, the criteria used by mathematicians when choosing where to publish, and how the Society should judge the success of its publications. There was debate about how best to articulate the role of LMS publications within the Society's charitable objectives. There was long-standing recognition within the LMS objectives that academic publication is a way for the Society to disseminate mathematical knowledge and make it available worldwide. However the feeling was that the act of disseminating mathematics information is no longer a challenge in the internet age, and that what the LMS is providing is in fact a service to authors and readers by supplying a 'stamp of quality' when an article or book is published by the Society.

The international reach and reputation of the journals was also recognised as being a clear benefit for the Society. The majority of the submissions and published articles

Table 1: Expenditure on supporting mathematics and the mathematical community

Advancing mathematics providing support to Women in Mathematics, other mathematics bodies both national and international, supporting the Library and archives and the giving of Prizes to recognise excellence in mathematics	£354,048
Enabling mathematics e.g. national and international grants schemes, research schools, support for early career researchers	£864,189
Disseminating mathematics: e.g. Publications, Society meetings and lectures (including the Mary Cartwright Lecture and regional workshops)	£691,301
Promoting mathematical research and its benefits e.g. Influencing decision and policy makers, shaping mathematics education, public lectures	£382,684

come from mathematicians outside the UK, and of course the readers of the journals are located all over the world.

One issue returned to multiple times during the Retreat was the tension between the wish for the Society to disseminate good mathematics as widely as possible, while at the same time providing a reliable source of income to fund the Society's other charitable activities. The Society works with its publishing partners to ensure that financial agreements deliver a healthy financial return to the LMS and its objectives while fairly compensating our partners for the services of production, distribution and marketing. The Society and its partners are committed to maintaining reasonable and ethical pricing for our publications, including free access to LMS members and readers in developing countries.

Publications income is critical to funding a whole range of different activities in support of the LMS charitable objects; during 2016/17 the Society awarded £646,004 in grants to support mathematical research. In addition to this Publications income also contributed to, amongst others, the running of Society meetings, Popular Lectures, and policy work to engage with government regarding mathematics education and funding for the mathematics people pipeline, in particular mathematics research. A full breakdown of the Society's charitable spend is given in Table 1.

At the Retreat the group identified potential disruptors to the traditional subscription model such as open access, wider systematic use of preprints outside physics and mathematics, and the increased availability of pirated

material. It was recognised that changes in attitudes and business models around and within scholarly publishing could ultimately lead to a situation where learned societies could no longer rely on publications income to support their activities and that planning and taking actions to attempt to mitigate this risk is essential.

After the Retreat ended a small sub-group took on the task of turning the recommendations and ideas into concrete proposals. They met five times focusing on the key areas of setting and monitoring objectives, governance, improving the author service, development of the *Bulletin*, *Journal*, *Proceedings* and *Transactions of the LMS*, and how best to communicate the mission behind the Society's publishing operation.

The first outcomes are beginning to be realised. A revised set of aims for the LMS publications are currently in the process of being agreed by Publications Committee and Council in order that they might guide future strategy. They focus on the role that the LMS journals and books play endorsing high-quality research on an international scale; providing services to mathematics and in particular to authors and readers. There is also a financial aspect to these services in delivering funding for the Society's charitable activities in support of mathematics and the mathematics community while still remaining conscious of the need for ethical pricing.

In addition proposals aiming to improve services to the Society's journal authors, and to provide greater clarity on the identities and ambitions of each of the journals, individually and as part of a coherent portfolio of publishing activities, are currently being implemented by Publications Committee. And there is much more underway as Publications Committee, Editorial Boards and publishing partners work together to develop publications valued by the Society and the wider mathematical community, both nationally and internationally.

Professor John Hunton
Publications Secretary

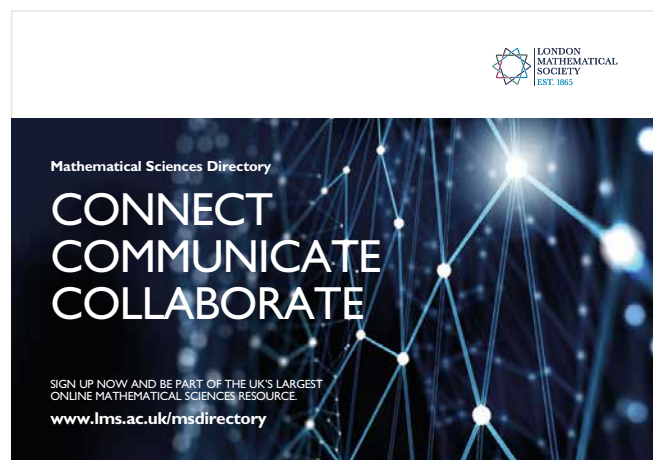
Publications News from the past year

In January 2017 the *Bulletin*, *Journal*, *Proceedings*, *Transactions of the London Mathematical Society* and the *Journal of Topology* moved to be published in partnership with John Wiley and Sons.

The *Journal of Topology*, celebrating its 10th volume of publication in 2017, also saw a change of Managing Editor with Constantin Teleman taking over from Ulrike Tillmann who had led the Editorial Board since the launch of the journal

The *LMS Journal of Computation and Mathematics* entered its final volume in 2017 having closed to new submissions at the end of 2015. The Society remains committed to making existing content available to readers in perpetuity. Currently this access will continue to be provided via the Cambridge University Press web platform *Cambridge Core*. New ways to incorporate computational mathematics into the publications portfolio are being developed by Publications Committee.

Nonlinearity, which the LMS co-owns with the Institute of Physics, moved into its 30th volume in 2017. In recognition of this anniversary *Nonlinearity* is publishing a series of invited articles on an ongoing basis over the course of 2017 and 2018, offering a rich blend of perspectives, reviews and open problems across key topic areas.



Connect, Communicate, Collaborate: LMS Mathematical Sciences Directory UK

In 2017 the Society launched the LMS Mathematical Sciences Directory UK, a comprehensive online resource for and about Mathematical Scientists in the UK.

Mathematical Scientists across the UK in academia, industry, education, commerce, enterprise and beyond will be able to use the Directory to find and network with potential research collaborators. It is hoped that this new resource will facilitate greater connection, communication and collaboration between Mathematical Sciences professionals and academics. The *MSDirectory UK* is a central resource for the mathematical community to network within its own discipline and reach out to colleagues in other sectors. It will also allow industrial partners to identify Mathematical Scientists working in their research area.

The Directory is open to anyone who holds, or is registered to study for, a Mathematical Sciences first degree or above from a UK institution, as well as anyone currently working in Mathematical Sciences in the UK without such a qualification. Mathematical Scientists from overseas can also join the Directory if they are now working in the UK.

There are currently over 6,000 UK-based Mathematical Scientists listed in the *MSDirectory*. As a community strengthening tool, the Society hopes that the *MSDirectory* will grow into the recognised and valued 'home' of Mathematical Sciences graduates in all career paths and that existing members will encourage colleagues and collaborators not already listed on the Directory to join.

You can join the Directory at lms.ac.uk/msdirectory

New look LMS Newsletter

The Society's Newsletter is a central resource for mathematical and Society news and events. In 2016-17 the Society undertook a major redesign of its monthly Newsletter. The work was undertaken by the Newsletter Review Group, chaired by the General Secretary, which sought input from the LMS membership on the content and appearance of the new Newsletter. A new Editorial Board (June-Barrow-Green, Open University; Tomasz Brezezinski (Swansea University); Lucia Di Vizio (CNRS); Jonathan Fraser (University of St Andrews); Jelena Grbić (University of Southampton); Thomas Hudson (University of Warwick); Stephen Huggett (University of Plymouth); Adam Johansen (University of Warwick); Bill Lionheart (University of Manchester); Kitty Meeks (University of Glasgow); Mark McCartney (Ulster University); Vicky Neale (University of Oxford); Susan Oakes (London Mathematical Society); David Singerman (University of Southampton); Andrew Wade (Durham University) was set up under the leadership of new Editor-in Chief, Dr Iain Moffatt (Royal Holloway, University of London).

The new Newsletter will be published six times a year and will provide the opportunity for a range of mathematical content as well as news of Society events and activities. The new look Newsletter sees the addition of Feature articles aimed at general mathematical readers along with micro-theses and nano-theses providing space in the Newsletter for current and recent research students to present their research findings to the wider mathematical community.

OTHER SOCIETY ACTIVITIES

Early career researchers

As part of its Committee restructuring the Society brought all its early career activities under the remit of one Committee, the Early Career Research Committee, with Professor Chris Parker (University of Birmingham) as its first chair.

Undergraduate Summer Schools

The Undergraduate Summer Schools aim to introduce exceptional non-final year undergraduates to modern mathematics and, in particular, to make them think seriously about a future academic career. The 2017 School, held at the University of Manchester, included a combination of short lecture courses given by mathematical experts alongside problem solving sessions and colloquium style talks. There were over 70 applications with 53 students receiving places to attend the School. The Scheme particularly encourages submissions from students at institutions that do not normally have a strong tradition of undergraduates continuing to PhD study. Since the Summer Schools started in 2015 over 150 undergraduate students have benefited from these events.

Research Schools

In partnership with the Clay Mathematics Institute and support from the Heilbronn Institute of Mathematical Research four Research Schools were run in 2017 with over 160 attendees. One LMS Research School was also run at the University of Kent.

- *New Trends in Representation Theory - The Impact of Cluster Theory in Representation Theory* (University of Leicester)
- *Microlocal Analysis and Applications* (Cardiff University)
- *Algebraic Topology of Manifolds* (University of Oxford)
- *Introduction to geometry, dynamics, and moduli in low dimensions* (University of Warwick)
- *Orthogonal Polynomials & Special Functions* (University of Kent)



Speakers at the LMS Research School in Kent (l to r) Kerstin Jordann, Walter Van Assche, Nalini Joshi



LMS Research School participants in Kent

150th Anniversary Postdoctoral Mobility Grants

The 150th Anniversary Postdoctoral Mobility Grants Scheme was set up to help early career researchers through the sometimes difficult time from submitting their PhD thesis to taking up their a postdoctoral position by supporting a period of study and research in a new institution. Ten postdoctoral graduates made visits to institutions in the UK, Europe and Canada in 2016-17. This was a Scheme set up for a three year period to celebrate the Society's 150th Anniversary. The final Grants were awarded in 2016/17 and 34 postdocs have benefited from these grants since 2015.

Undergraduate Research Bursaries

The fifth round of the Undergraduate Research Bursaries Scheme in 2016-17 proved to be very successful with 105 applications received from 29 institutions. There was also a significant increase in the number of institutions offering to provide match-funding if the grants were successful. Forty two awards were made and 39 of these were co-funded by the department. To date around 150 students have benefited from a Research Bursary.

Other activities

In addition to offering specific schemes the Society continues to support a range of other activities aimed at early career researchers. These include supporting the *Young Researchers in Mathematics* (YRM) Conference, held at the University of St. Andrews in August 2016, in partnership with the IMA, Think Tank and Winton and attended by 80 early career researchers.

The Society also funded the *LMS Prospects in Mathematics* event, which was held at York University in December 2016 and attended by 47 undergraduates from around the UK. From 2017, the *LMS Prospects in Mathematics Meetings* will be held in September each year to help students learn about the PhD research opportunities in different areas of mathematics before choosing their final year modules. These meetings are important events to encourage and support students to pursue careers in Mathematical Sciences research.

‘(It was) the first proper mathematical conference I had ever attended, and the first real opportunity I had to interface with experts from such a varied range of research areas. I was stunned at the quality of speakers in the line-up: professors from Oxford, Cambridge, Edinburgh, UCL, Imperial, Cardiff, and plenty of others were in attendance to give a wide variety of talks on areas ranging from random matrix theory and L-functions to propositional logic, Galois representations and the mathematics of Planet Earth’.

Damien Clarke, student from Aberystwyth at LMS Prospects in Mathematics 2016

Society Meetings

The Society continues to run a varied programme of Society Meetings and Workshops around the UK with Regional Meetings & Workshops held in 2016-17 on *Interactions of Harmonic Analysis and Operator Theory* in Birmingham, on *Variational Methods in Submanifold Theory* in York and joint workshops on *New Developments at the Interface between Geometry and Physics* and *Partially Ordered Materials – Mathematical Perspectives and Challenges* in Bath.



Delegates at the 2016 YRM poster session

In October 2017 the Society also held a Joint Meeting with the Royal Statistical Society and the Fisher Memorial Trust on *Data Science: The View from the Mathematical Sciences*.

The 2017 *British Mathematical Colloquium* (BMC), was held in Durham from 3-6 April. The event was organised by Andrew Lobb and Alexander Stasinski (University of Durham) and supported by the LMS, the Heilbronn Institute for Mathematical Research, Oxford University Press, Cambridge University Press, Springer, Wiley and Foundation Compositio Mathematica. A Society Meeting was also held at the event, which included a lecture by Professor Isabelle Gallagher, Paris Diderot University.

WOMEN IN MATHEMATICS

The Society continues its commitment to improving the proportion of women in mathematics and to helping ensure that equal opportunities are embedded within Mathematical Sciences departments for the benefit of everyone working and studying within UK university departments.

The Society was delighted to be awarded the inaugural Royal Society Athena Prize in 2016 for its work supporting women in mathematics. The Royal Society recognised the work that the Society has undertaken in introducing a broad range of initiatives in the field of mathematics, that have resulted in a change of culture nationwide and its leadership in this area that has demonstrably increased the number of women in mathematics. The Prize is a recognition of the huge amount of work undertaken by the women and men of the LMS Women in Mathematics (WiM) Committee

The Royal Society
Athena Prize
Medal



The Medal presentation ceremony (l to r) Professor John Greenlees (Vice-President LMS), Katy Henderson (Secretary, WiM Committee), Dr Eugenie Hunsicker (Chair, WiM Committee), Dr Gwyneth Stallard (WiM Committee), Dr Catherine Hobbs (WiM Committee)



Having fun with maths in Swansea

since its establishment in 1999. The Society received a medal as well as a £5,000 award.

This year the Committee opened up the organisation of the Women in Mathematics Days to expressions of interest from departments, and made awards to Birkbeck University of London and the University of Warwick. The event hosted by Birkbeck University of London received additional funding from Winton, and the Institute of Mathematics and its Applications provided funding for an industry speaker at the University of Warwick event.

The Committee also initiated a Girls in Mathematics Events scheme, inviting expressions of interests for departments to host events for school age students, to encourage girls to consider the possibility of future study in mathematics by demonstrating the possibilities of the subject in fun and inspiring ways. Three awards were made for events held in 2016-17 to the Universities of Liverpool, Swansea and Kent. Both of these schemes received a strong number of applications for the available funding, indicating the level of interest within the community for providing activities that encourage and support girls and women in mathematics.

The Committee is also working on an online resource for young people, *Success Stories in Mathematics* to provide examples of how mathematics is used in a wide range of careers and to demonstrate the variety of career options available to anyone who holds a mathematics degree. The planned launch for the resource is Spring 2018.

LMS LECTURESHIPS

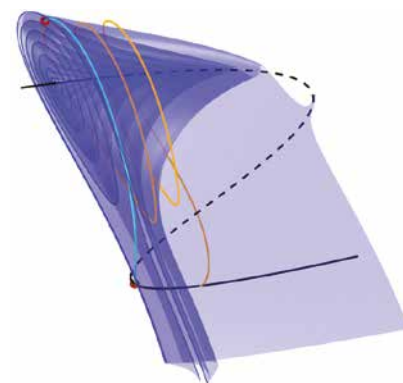
International Lecturers



**Professor Hinke
Osinga**

The Society's funding for visiting international lecturers helps enable UK-based mathematicians to engage in dialogue with current mathematical thinking from across the world. International lecturers included the 2017 LMS Invited Lecturer, Professor Jim Agler (University of California, San Diego), who gave the Invited Lectures Series at Newcastle University on *Function Theory by Hilbert Space Methods*.

The 2017 LMS-NZMS (New Zealand Mathematical Society) Aitken Lecturer, Professor Hinke Osinga (Auckland University) visited the UK in May 2017 to give lectures at Bath, Cambridge, Exeter and Oxford as the first part of the LMS-NZMS Aitken Lecture Tour 2017. The second part of the Tour took place in October 2017 and include visits to Bristol, Kent, Newcastle and Warwick.



Structural failure in a sinusoidal earthquake is organised in an asymmetric but recurrent manner in the frequency-amplitude plane around the natural frequency of the structure

Mary Cartwright Lecture

The 2017 Mary Cartwright Lecturer was Dr Rebecca Hoyle (University of Southampton) who presented a lecture entitled *Transgenerational plasticity and environmental change*. Prior to the Mary Cartwright Lecture Dr Sinead English (University of Cambridge) gave a presentation entitled *Information use within and across generations: implications for understanding animal development and non-genetic inheritance*.



LMS MEMBERSHIP

312 new members joined the Society in 2016-17, including 109 female members. The membership is the core of the London Mathematical Society. Mathematicians drive the Society and volunteers' contributions are vital to the Society in defining its priorities, running its activities and achieving its objectives.

The network of LMS Departmental Representatives across UK universities is a major communication channel for the membership activities of the Society and as of 2016-17 the Society has 60 LMS Representatives. The Annual Reps Day took place at De Morgan House in May 2107 and was attended by around 30 Representatives. The event is an opportunity to meet with colleagues, and discuss a range of issues relevant to the Society and its future activities. In addition the Society now has a network of 58 Good Practice Scheme (GPS) Supporters providing a link between the Society and the GPS-supported departments. The LMS also actively seeks to recruit more Representatives/GPS Supporters to ensure that all UK mathematical departments are directly engaged with the Society. Departments that do not currently have a Representative and are interested in having one should contact the LMS Treasurer (robcurtis.mog@gmail.com). Queries about joining the GPS Scheme should be directed to Katy Henderson (womeninmaths@lms.ac.uk)



Dr Dmitriy Rumynin (University of Warwick) and LMS President-Designate, Professor Caroline Series, at the LMS Reps Day



LMS Treasurer Professor Rob Curtis gives a presentation at the LMS Reps Day

DEVELOPMENT

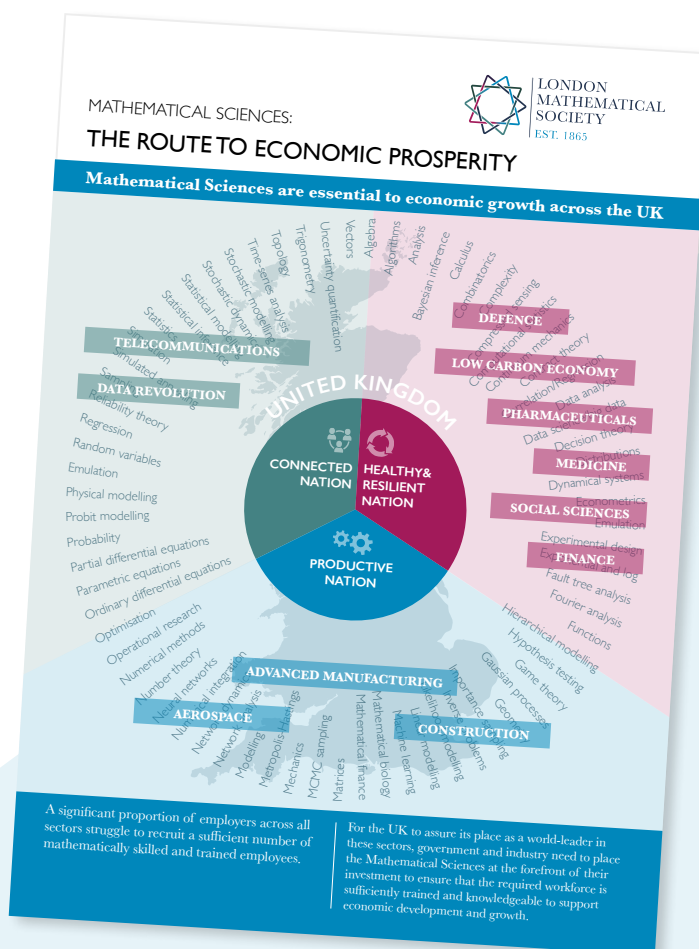
The Society will be prioritising its Development activities in 2017-18, to help ensure that the financial foundation of the organisation is as secure as possible for future generations, as well as helping to make sure that the importance of the Mathematical Sciences is understood widely in industry and beyond.

Spring Reception

In May 2017 the LMS held its second Spring Reception in Westminster, once again generously hosted by LMS member Dr Richard Golding. The Reception was attended by 60 guests representing government departments, financial institutions, professional bodies, consultancy and technology firms as well as academics from a range of mathematics-influenced disciplines. The Spring Receptions were initiated for the Mathematical Sciences Community to engage directly with parliamentarians, civil servants and industrialists, with respect to the Mathematical Sciences.

The focus of the 2017 Reception was on Mathematical Sciences research and the Society was delighted to have Sir John Kingman (Chair of UKRI) and Professor Philip Bond (Chair of the Review of Knowledge Exchange in the Mathematical Sciences) as invited speakers. Both spoke about the current research and funding landscape in the UK. The primary aim of the Reception was to develop connections with various different areas that use mathematics and with those who are influential in terms of policy and funding.

The LMS also produced a brochure for the Reception entitled *Mathematical Sciences: The Route to Economic Prosperity*, which provided information on how the Mathematical Sciences are essential to economic growth across the UK tinyurl.com/y7ym6ruz.



LMS PRIZES

The winners of the 2017 LMS Prizes were announced at the Society meeting on Friday 3 July 2017. The Society extends its congratulations to these winners, and its thanks to all the nominators, referees and members of the Prizes Committee for their contributions to the Committee's work this year. www.lms.ac.uk/prizes

Pólya Prize



Professor Alex Wilkie FRS
(University of Oxford)

Senior Whitehead Prize



Professor Peter Cameron
(University of St Andrews)

Senior Anne Bennett Prize



Professor Alison Etheridge FRS
(University of Oxford)

Naylor Prize and Lectureship



Professor John Robert King
(University of Nottingham)

Berwick Prize



Professor Kevin Costello
(Perimeter Institute, Canada)

Whitehead Prize



Dr Julia Gog
(University of Cambridge)

Whitehead Prize



Dr András Máthé
(University of Warwick)

Whitehead Prize



Dr Ashley Montanaro
(University of Bristol)

Whitehead Prize



Dr Oscar Randal-Williams
(University of Cambridge)

Whitehead Prize



Dr Jack Thorne
(University of Cambridge)

Whitehead Prize



Professor Michael Wemyss
(University of Glasgow)

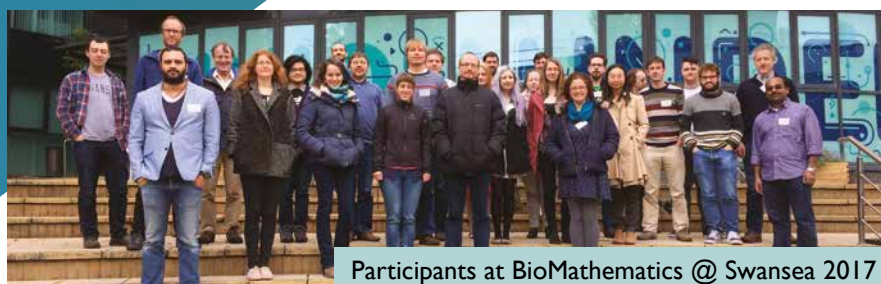
Joint LMS/IMA Awards

David Crichton Medal



Professor I David Abrahams
(Isaac Newton Institute)

LMS GRANTS



Participants at BioMathematics @ Swansea 2017

The LMS continues to offer a wide range of established grant schemes to support mathematical activities, including conferences, joint research activities, collaborative meetings and visits. The Society is particularly concerned with providing help for mathematicians (including research students) at an early stage in their careers.

£705,252 was awarded in grants in 2016-17 to support mathematical activities. This represented 194 grants of which:

- 75 grants were awarded to support mathematical conferences and meetings
- 21 grants were awarded to support institutional visits between mathematicians based in the UK and abroad
- 98 grants were awarded to support UK-wide joint research groups and collaborative research visits, both in the UK and abroad

In addition, three international grants were awarded in conjunction with the African Mathematics Millennium Science Initiative (AMMSI) to support attendance at African mathematical conferences.

Success stories

LMS grants have many positive benefits for individual mathematicians, the national and international community and for the advancement of the discipline. Below are some examples of how LMS grants have benefited the mathematical community.

BioMathematics @ Swansea 2017

‘Both sessions were characterised by lively and constructive interdisciplinary discussions, both in the post-talk questions and during the breaks, and received overwhelming positive feedback from participants. PhD student participation was significant, including 3 well-received contributed talks and several posters, and there were also a number of talks by local speakers (Nithiarasu, Boileau, Finkelshtein, Fowler, Strömbom) that helped to highlight Swansea activity to a wide national and international audience’.

Dr E. Crooks (Swansea)

More information about the Society’s grants is available www.lms.ac.uk/grants

Support of collaborative research (with Professor C. Semple)

‘These discussions have turned out to be very fruitful and together with co-workers they are currently in the final stages of finalizing a journal paper summarizing the outcomes of the project... In addition, the PI and CI also started working on an exciting new project concerned with understanding phylogenetic networks from the perspective of distances’.

Dr K. Huber (University of East Anglia)

International short visit to the University of Nairobi (Kenya)

‘I was able, as hoped for in my application, to get to know many of the students more closely and to discuss their research projects in some detail. This has led to several ongoing email exchanges about the students’ research projects, and about possible PhD and postdoctoral positions. There was also time for discussion of research problems among the lecturers, and in particular Dr Paunonen, Professor Batty and I managed during the first week of the summer school to make some important progress with one of our ongoing research projects. Overall, the summer school was a very useful experience both for the student participants and for the lecturers, and this grant helped significantly by allowing me to be present throughout. I am grateful to the LMS for supporting me and, indirectly, pure mathematics in East-Africa’.

Dr D. Seifert (Oxford)



International short visit to the University of Nairobi

Young Theorists Forum (YFT) 9

‘With 72 registered attendees this was a vibrant event – succeeding in its aim of fostering development of early career researchers and encouraging collaboration between different universities. Overall, 29 PhD students had the opportunity to present a 20 minute talk on their research, with each talk being followed by a brief discussion session’.

Professor A. Taormina (Durham)

REPRESENTING AND INFLUENCING

The Society continues in its efforts both individually and under the auspices of the Council for the Mathematical Sciences (CMS) to engage with decision makers in Parliament and across other STEM organisations to underline the importance of the Mathematical Sciences in our modern society. This has included responding to government and national agency consultations, taking part in the STEM for Britain competition for the fourth year and supporting *Voice of the Future* and *Parliamentary Links Day*.

During the past year the LMS has submitted responses to government and national agency consultations.

- *Statement on the teaching and assessment of mathematics degrees* (General) tinyurl.com/ycmfskb3
- *Schools that Work for Everyone* (DfE) tinyurl.com/guw37uh
- *Higher Education and Research Bill* (House of Commons Public Bill Committee) www.lms.ac.uk/sites/lms.ac.uk/files/LMS_HERbill_submission.pdf

The Council for the Mathematical Sciences (CMS) also provided responses to important consultations directly affecting the Mathematical Sciences.

- *Consultation on the Second Research Excellence Framework* (HEFCE) tinyurl.com/m5opbk4
- *Inquiry into Implications and Opportunities for Science and Research on Leaving the EU* (House of Commons Science and Technology Select Committee) cms.ac.uk/files/Submissions/article_580f7059761d37.60246855.pdf



Top: Professor Sir Adrian Smith, Chair, Council for the Mathematical Sciences (CMS)

Bottom: Professor Frank Kelly, Chair, Advisory Committee on Mathematics Education (ACME)

CMS at the House of Commons

The Council for the Mathematical Sciences (CMS) (www.cms.ac.uk) held an event in February 2017 at the House of Commons on *Mathematic Education*, hosted by Stephen Metcalfe MP, Chair, Science and Technology Select Committee. Over 100 invited guests attended from parliament, (including Sir Julian Brazier MP and Stephen Timms MP) government departments (including the Department for Education), academia, education and a range of Science, Technology, Engineering and Mathematics (STEM) organisations. Guests had the chance to network with colleagues and also heard an address from Professor Sir Adrian Smith, Chair, CMS, about his review of post-16 mathematics provision in England (tinyurl.com/y9cmgvw5) The invited guests also heard from the new chair of the Advisory Committee on Mathematics Education (ACME) (www.acme-uk.org) Professor Frank Kelly, about new developments within the Committee and the vision moving forward.

STEM for Britain Awards

The Mathematical Sciences has now become an integral part of this Annual event, which gives early career researchers the opportunity to present their research in Parliament. This is the fourth year that the Mathematical Sciences have taken part in the competition and this is the first year that the competition has been run under the STEM for Britain title in recognition of the contribution of the Mathematical Sciences.

This year's competition was held in the House of Commons on Monday 13 March 2017. Three mathematicians won medals and awards for the excellence of their mathematical science research. Dr James Grogan (University of Oxford) won the Gold Award and £3,000 for his research on combining state-of-the-art, high resolution computer modelling and imaging in cancer research, Laura Wadkin (Newcastle University) won the Silver Award and £2,000 for her research on mathematically modelling stem cell colony development and Dr Bartosz Naskrecki (University of Bristol) won the Bronze Award and £1,000 for his research on the *Generalized Fermat Conjecture*.

The Gold and Silver Awards were both sponsored by the Clay Mathematics Institute and the Bronze Award was sponsored by the Heilbronn Institute for Mathematical Research.

‘The CMS is delighted that the mathematical sciences have been involved in this prestigious event once again, it is wonderful to showcase the importance of the mathematical sciences to a wider audience. It is paramount to encourage early-career research scientists, engineers, technologists and mathematicians and the STEM for BRITAIN event is a very effective way of doing this. We have been encouraged by the enthusiastic response from early-career researchers in the mathematical sciences and feel sure this will continue in the future’.

Professor Sir Adrian Smith, Chair, Council for the Mathematical Sciences (CMS)



Back Row, l to r, Professor Jonathon Keating (Heilbronn Institute for Mathematical Research), Dr Stephen Benn (Royal Society of Biology), Professor Nick Woodhouse (Clay Mathematics Institute), Stephen Metcalfe (Parliamentary and Scientific Committee)
Front Row, l to r Dr Bartosz Naskrecki, Dr James Grogan, Laura Wadkin

Voice of the Future

The Council for Mathematical Sciences (CMS) once again nominated young mathematical scientists to take part in this year's Voice of the Future event. The event is an opportunity for scientists aged 16-35 to put their questions to an assembled panel of MPs at the House of Commons. The event, organised by the Royal Society of Biology, took place at Portcullis House on Wednesday 15th March 2017.



Ben Ludford (Efficio Consulting) representing CMS at Voice of the Future

This year's CMS nominated panelists for the Mathematical Sciences were Jenny Ashcroft (University of Kent), Anna Lambert (UCL) and Ben Ludford (Efficio Consulting). Members of Parliament attending

the event included the members of the House of Commons Select Committee for Science and Technology. Jo Johnson MP, Minister of State for Universities, Science, Research and Innovation and Chi Onwurah MP, Shadow Minister for Business, Energy and Industrial Strategy. The event was also attended by Sir Mark Walport the Government Chief Scientific Adviser and Chief Executive, UKRI.

More information about the event is available at tinyurl.com/yajf8fc

Parliamentary Links Day

Representatives from a wide range of STEM organisations, academics, MPs and industrialists gathered for the annual *Parliamentary Links Day* event in Westminster on 27 June, organised by the Royal Society of Biology on behalf of the science and engineering community.

The audience was welcomed by the Speaker of the House of Commons, the Rt Hon John Bercow MP and heard keynote presentations from the Minister for Universities and Science, Jo Johnson and Sir John Kingman, Chair, UK Research and Innovation (UKRI). Jo Johnson highlighted the need to address geographical economic imbalances and the willingness of the government to maintain EU collaboration after Brexit. Sir John Kingman stressed that the UKRI is an important strategic objective for government and that it will look to improve oversight across Research Councils and science disciplines.

The presentations were followed by two panel sessions, the first looking at Science and Europe and the second panel looking at Science and the World. On the first panel were Chi Onwurah MP, Shadow Minister for Business, Energy and Industrial Strategy; Chris Hale, Universities UK; Professor Roberto Di Lauro and Dr Lorenzo Melchor, Science Attachés of the Italian and Spanish embassies respectively and Dr Sarah Main, Director, Campaign for Science and Engineering. This panel in particular discussed the mobility of scientists and the concerns from EU scientists about taking up positions in the UK.

On the other panel were Professor Dame Jocelyn Bell Burnell, President, Royal Society of Edinburgh; Malcolm Brinded, Chair, Engineering UK and Professor Sir John Holman, President, Royal Society of Chemistry. Among the areas discussed were the need for specialist scientists in primary schools, and better careers advice for students.

The event was followed by a luncheon at the House of Lords, which included an address by Professor Alex Halliday, Vice-President, Royal Society. Professor Halliday's address is available at royalsociety.org/news/2017/06/alex-halliday-westminster



Anna Lambert (UCL) puts a question to the panel at *Voice of the Future*

PROMOTING MATHEMATICS

During 2016-17 the Society continued to promote its event and activities to the wider mathematical community. The Society has built a successful social media presence over the past two years and in 2016-17 the number of followers to its two Twitter accounts ([@LondMathSoc](#) and [@WomeninMaths](#)) had risen to an impressive 13,000. The widening of the Society's digital footprint along with regular e-Updates to members and LMS representatives are helping to extend the Society's reach in promoting Mathematical Sciences. The Society also continued to build video material from selected meetings and its Popular Lectures, which are broadcast on the LMS YouTube channel (tinyurl.com/n849jv4). The Society's YouTube Channel now has nearly 3,500 subscribers and in particular a Sir Roger Penrose's presentation during a Science Museum *Lates* event has attracted over 20,000 views. The *Lates* event was part of the Society's 150th Anniversary celebrations. The Society is continuing its efforts to target specific audiences and will be looking into further social media projects to achieve this.

Popular Lectures

This year's Popular Lectures in London and Birmingham, featuring Dr Jason Lotay (University College London) and Professor David Tong (University of Cambridge), continued to attract large audiences. Dr Lotay's talk was titled *Adventures in the 7th Dimension* and took the audience on a mathematical journey across multiple dimensions, exploring their role in art, science and popular culture. Professor Tong's lecture titled *The Unreasonable Effectiveness of Physics in Mathematics* looked at the close relationship between mathematics and theoretical physics. In particular, how physicists have developed new tools, such as quantum field theory and string theory, which are providing insight into questions in pure mathematics in their quest to understand Nature.



The LMS has continued to build followers on Twitter



Above: Dr Jason Lotay takes the audience into the 7th dimension
Left: Professor David Tong presents his Popular Lecture

Collaborating with other organisations

The Society continues to work in collaboration with the IMA in the Joint Promotion of Mathematics (JPM), and also with the British Science Association Mathematical Sciences Section in developing Mathematical Sciences content for the annual British Science Festival.

The JPM Steering Group also supported a new conference titled *Talking Maths in Public*. The two day conference at the University of Bath was aimed at those working and participating in communicating mathematics to the public, with the chance to participate in workshops, share ideas and get to know each other

As part of JPM the Society takes part in events such as the Bloomsbury Festival and continues to produce *Maths Inside* leaflets in association with exhibitors at the Royal Society Summer Science Exhibition. This year's leaflets were titled, *Dinosaurs to Forensics: Unlocking secrets of the past with the help of mathematics*; *Engineering Cycling Gold: How mathematics can help us go faster*; and *Safe and Sound: Non-destructive testing with the help of mathematics*. The leaflets can be viewed at www.lms.ac.uk/about/mathematics-promotion-unit



The 2017 *Maths Inside* leaflets



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