



LONDON
MATHEMATICAL
SOCIETY
EST. 1865

ANNUAL REVIEW

2018–2019





On 19th October we celebrated the 21st anniversary of the opening of De Morgan House. The LMS has come a very long way since it took the plunge and bought 57–58 Russell Square. Even after two years as President, I am still learning about the full breadth of our activities. With over 250 volunteers involved in our 26 committees and other roles, the LMS not only achieves a great deal in concrete terms but also plays a critical role in bringing together and enriching the UK mathematics community across subject and institutional divides.



WELCOME FROM THE PRESIDENT

After five years of work and extensive consultation, the review and updating of our Standing Orders (Charter, Statutes and By Laws) is drawing to a conclusion. The date of the AGM has been moved back a few weeks to accommodate the formal procedures of the Privy Council, allowing voting on the revision to take place in conjunction with the usual Council elections. All being well it will come into force early next year.

January brought the sad news of the death of Sir Michael Atiyah, our distinguished former President. Council discussed various possible ways of commemorating him and took the initiative in proposing a major international conference on the Unity of Mathematics which will take place September 22–24, 2020 in the Isaac Newton Institute in Cambridge.

Work on the Bond Review has continued, now rebranded as the Big Mathematics Initiative. Two committees chaired by Dr Claire Craig and Sir Bernard Silverman are working to transform recommendations in the review into concrete possibilities.

It is now two years since the launch of the new format Newsletter. The feature articles in particular have been very well received. Having served for three years, including a year preparing for the new launch, the first Editor-in-Chief Iain Moffatt is standing down, and the Society would like to thank him for all his work in producing such an excellent newsletter. We are pleased to welcome as his successor Eleanor Lingham of Sheffield Hallam University who brings considerable editorial experience to her new role. Members will have noticed the new compostable wrapper for the Newsletter. In other action on the environmental front we are commissioning a full energy audit of De Morgan House and taking steps to reduce the vast amount of paper used in meetings by making it standard practice across all committees to only provide hard copy of papers on request.

Our expansion since the move into DMH has been predicated on a healthy publications income, the profits from which are ploughed back into furthering the Society's core aims. One cloud on the horizon is that the move towards Open Access is likely to result in a significant drop in our income. For this reason, one of my aims as President has been to make it easier for people to donate to the LMS. You will now find a 'Donate' button on our website. A new venture, the De Morgan Friends, has just been launched for anyone who finds themselves in a position to give at least £1,865 to the Society, reflecting the year in which the Society was set up and Augustus De Morgan became the first President. We have benefitted from several very substantial legacies in the past and of course the LMS is always extremely grateful for any money which comes to us through bequests.

It has been a great privilege to have been at the helm for the past two years. I would like to pay tribute to the dedication and enthusiasm of all our staff, in particular Fiona Nixon, without whom much of what we now do would not be possible. I have been working with our next President, Jon Keating, throughout this year and I have no doubt that the Society will thrive in his capable hands.

Professor Caroline Series, FRS
President, London Mathematical Society

ABOUT THE LMS

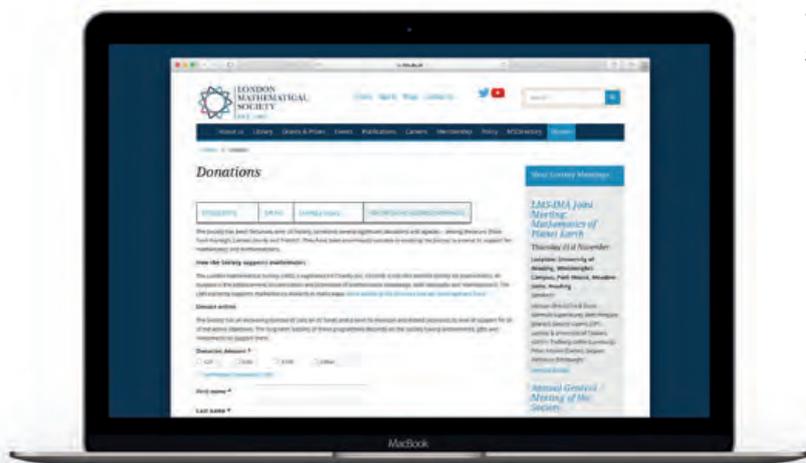
The London Mathematical Society (LMS) is the UK's learned society for mathematics. Its purpose is the advancement, dissemination and promotion of mathematical knowledge, both nationally and internationally. The Society receives its resources through publishing, investments, membership fees and endowments. 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.

www.lms.ac.uk

SECURING THE FUTURE OF THE SOCIETY AND MATHEMATICS

The London Mathematical Society is always very grateful to anyone able to make a donation to further its charitable works and to support the development of mathematics more widely. All surplus income from the LMS publications is used entirely to support mathematicians and mathematics research. This includes activities such as funding mathematics conferences, awarding mathematics research grants, giving prizes for mathematical accomplishments, and representing mathematics to government and national policymakers. However, this income is potentially under threat due to the move towards Open Access. Thus, the long-term stability of the Society's programmes is increasingly likely to depend on endowments and gifts, while at the same time LMS Council is keen to maintain, indeed to increase, the volume and breadth of its activities.

The Society has been fortunate historically to receive a number of major donations and legacies including those of Lord Rayleigh, Joseph Larmor, G. H. Hardy, Albrecht Fröhlich and Samuel Verblunsky. This year the Society launched a Donations and Legacy page on its website so that the Society can receive donations online. There is a DONATE button on the LMS website including details of our new scheme, the 'De Morgan Friends', for those in a position to give £1,865 or more to the Society, which at the time of printing has already received its first two £1,865 donations. www.lms.ac.uk/content/donations



The LMS Donations and Legacy web page.

DEMORGAN@21

On 16 February 1998, the London Mathematical Society moved from its previous premises in Burlington House, rented from the Royal Astronomical Society, and purchased the long leasehold on 57-58 Russell Square, renaming the property 'De Morgan House' in honour of the first LMS President Augustus De Morgan.

The official opening was celebrated with a gathering on 23 October of that year and it was decided to mark the 21st anniversary of this occasion.

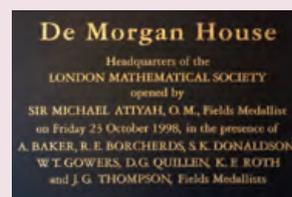
DeMorgan@21 took place on 19th October 2019 and was attended by over 70 guests, including past-LMS Presidents, other LMS Officers, LMS members and LMS staff, many of whom took part in the original move. The audience heard about *The Wit and Wisdom of Augustus De Morgan*, from Professor June Barrow-Green and was treated to reminiscences about the move to De Morgan House from Sir John Ball, Susan Oakes and Sir Martin Taylor. The 2018 Fields Medallist Professor Caucher Birkar said a few words on his connections with the LMS and continued the representation of Fields Medallists at De Morgan House, several of whom attended the original opening ceremony.

The LMS President, Professor Caroline Series, closed proceedings by describing how the purchase of De Morgan House has been a resounding success and that the 'foresight of those involved has been more than justified'. The move to De Morgan House has enabled the LMS to expand its charitable activities enormously, so that there are now 18 staff providing support to the Society's publishing enterprises and the 20+ LMS committees, besides organising events around the UK and abroad, administering the full raft of grant schemes, supporting its growing membership and dealing with many other activities.

The LMS continues to grow and flourish, taking on more activities and roles, none of which would be possible without De Morgan House and the facilities it offers.



1



2



3



DeMorgan@21



4



5

1. Participants at DeMorgan@21.
2. Plaque commemorating the opening of De Morgan House.
3. L to R: Richard Borcherds, Klaus Roth, Dan Quillen, Timothy Gowers, Michael Atiyah, Simon Donaldson and Alan Baker at the opening ceremony in 1998.
4. The cover of the DeMorgan@21 commemorative booklet (Painting by J. Love, 1998).
5. Picture of Augustus De Morgan presented by David Larman on behalf of the Mathematics Department, UCL, 23rd October 1998.

SUPPORTING RESEARCH: DISSEMINATING KNOWLEDGE

LMS Publications Committee continues to be guided in its work by the strategic approach developed following the 2017 Publications Strategic Retreat. The Society's Publications Aims focus on the provision of services for authors and readers, leadership and representation within UK mathematics publishing, and sustainability of the Society's income from publishing.

One agreed action from the Retreat was to better define the role of each of the LMS journals. In 2018/19 Publications Committee and the Managing Editors took steps in this direction.

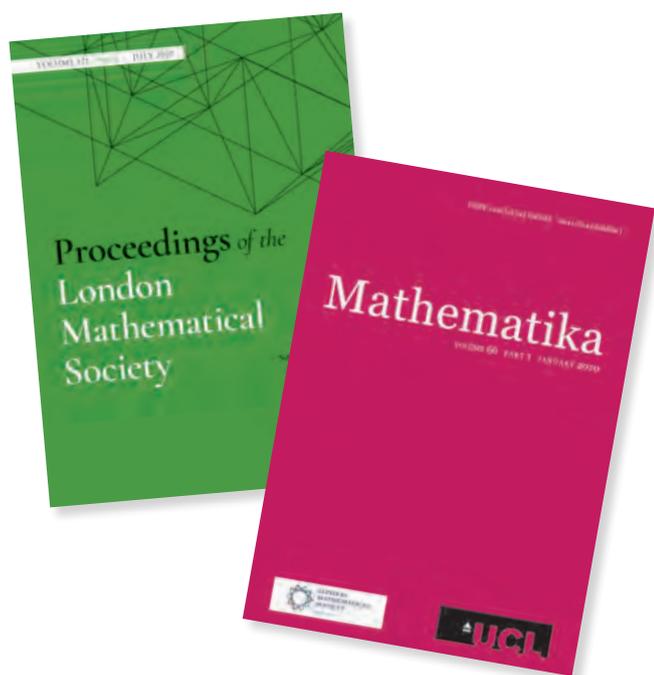
The major highlight of this year was the relaunch of *Proceedings*, with the appointment of a new distinguished editorial board. Founded in 1865, *Proceedings* is today seen by many as the flagship journal of the LMS. In 2018 the Managing Editors, Tim Browning and Oscar Randal-Williams, were charged with elevating the position of *Proceedings* further and strengthening its position in relation to other top-flight mathematics journals.

The first step in this endeavour was to appoint an Editorial Board of leading international experts, including Nalini Anantharaman, Hélène Esnault, Bryna Kra, James McKernan, Manuel del Pino, Raphaël Rouquier, Scott Sheffield, Anna Wienhard and Daniel T. Wise. The Editorial Board has been selected to attract articles of the highest quality and significance across a broad spectrum of mathematics, and the editorial procedures have been designed to help ensure submissions are dealt with in an efficient and timely manner. Since March 2019 this Editorial Board has been handling new submissions to the *Proceedings* holding them to standards consistent with the journal's new quality criteria.

As well as the major relaunch of *Proceedings*, changes to the other LMS journals were also made in 2019. The upper page limit for submissions to the *Journal* was removed. Papers of 18 pages and upwards that represent a significant advance in mathematical knowledge, as well as those that are deemed to stimulate new interest and research activity are welcomed for consideration. Shorter papers, under 20 pages, are considered by the *Bulletin*, which has published several new, authoritative survey articles over the past 12 months.

In addition to these changes to the Society's publications, new Managing Editors have been appointed for the *Bulletin*, Andrey Lazarev and Sibylle Schroll beginning their term in 2019. The Society also welcomed new Managing Editors for the *Journal*, Mark Haskins and James Maynard in 2018 and 2019 respectively.

The scope of the *Transactions*, the Society's fully open access journal, has been extended to include specialised articles within the general subject areas published by the Society. It is now included in the Emerging Source Citation Index (ESCI), the Directory of Open Access Journals (DOAJ) and Scopus.



Mathematika is owned by University College London (UCL) and published on their behalf by the LMS. In 2019 a contract was signed with John Wiley & Sons Ltd for taking on the production, sales and distribution of *Mathematika* on behalf of the Society for five years from January 2020.

The world of scholarly communication is changing, and conversations continue apace about the desirability and feasibility of a transition to fully open access models. In 2019 the Society responded to the *Guidance on the Implementation of Plan S (for full and immediate Open Access)* and, as part of the *UKRI Open Access Review* provided evidence on the value of the Society to the research community.

BUILDING A SUSTAINABLE FUTURE FOR MATHEMATICS RESEARCHERS

The Society plays a crucial role in supporting mathematics in the UK through its research grant schemes. In 2018-19, £698,175 was awarded across its grants portfolio. The grant schemes provide vital support for mathematicians at different stages in their careers, allowing UK mathematicians to undertake research in pairs, organise conferences and workshops, and invite collaborators to the UK. This provides opportunities to exchange ideas as well as supporting research and career progression

The Society typically receives between 230 and 250 applications a year for its research grants and in 2018-19 the Society supported 70% of all research grant applications received under the various research grant schemes. There has been a marked increase in applications for financial aid to support conference grants (Scheme 1), as well as a steady increase in the applications to support collaborative research (Schemes 3 and 4 in particular). It is expected that the volume of applications received by the Society will continue to grow due to the difficulty in accessing external funding for mathematics research.

SHAPING THE NEXT GENERATION

During 2018-19 the Society has continued to prioritise early career researchers and to invest resources in this important stage of the mathematics people pipeline. The Early Career Research Committee provides a strategic overview of the various schemes and activities that the Society offers for undergraduates through to postdoctoral researchers, as well as awarding a wide range of grants and fellowships, including Grants for Postgraduate Conferences; LMS Research Schools; LMS Prospects in Mathematics Meetings; Undergraduate Research Bursaries, which this year attracted 81 applications from 32 institutions; LMS Undergraduate Summer School, which this year attracted applications from 26 universities across the UK; Grants for Meetings of Undergraduate Mathematical Societies and Travel Grants for Young Researchers; Grants to Celebrate New Appointments and the Cecil King Travel Scholarship.

With a particular focus on early career researchers one of the major programmes to be launched in 2018-19 was a new scheme of Early Career Fellowships to support early career mathematicians in the transition between PhD and a postdoctoral position for a period of between three and six months. In its first year the scheme received 47 applications and awarded 11 Fellowships each with a value of £1,200 per month (plus £800 travel costs). The Early Career Fellowships follow on from the 150th Anniversary Postdoctoral Mobility Grants, which ran from 2014-2017 and awarded 38 grants during that time.



Delegates listen to a presentation at the LMS Graduate Student Meeting.

The period between the end of the PhD degree and the beginning of a first academic job can be an uncertain time for early career researchers and the Early Career Fellowships are designed to help young researchers during what can be a difficult transition. The 11 successful Fellowships in 2018-19 have a global reach and are distributed in the UK, mainland Europe and the US. The successful applicants are from a range of disciplines and institutions, including Warwick, Oxford, Leeds, Open University, Imperial College, Durham and Edinburgh in the UK, Padova in mainland Europe and a combined Fellowship with Columbia and Princeton in the US. www.lms.ac.uk/grants.

Past recipients of the Postdoctoral Mobility Grants found them to be an extremely valuable stepping-stone in their early careers as can be seen from the feedback below given by two previous Fellowship holders:

'Thanks to this scheme I managed to complete some research work related to my PhD thesis and at the same time I started collaborations with expert researchers in my area in a new working environment'.

'I really enjoyed this opportunity and I am incredibly grateful to the LMS for enabling me to have this experience. I think it has had a hugely positive impact on my career'.

We hope that the newly launched Fellowships will continue with this success.



Participants at a MARM training workshop in Cape Town, South Africa.

SUPPORTING OVERSEAS EARLY CAREER RESEARCHERS

As well as supporting UK-based mathematics, the Society also supports mathematical activities on an international level. In 2018-19, a total of £8,240 was awarded in four grants under the Society's Scheme supporting postgraduate attendance to conferences in Africa, organised by the African Mathematics Millennium Science Initiative (AMMSI).

The current partnerships under the *Mentoring African Research in Mathematics* (MARM) programme continued in 2018-19. MARM operates in collaboration with the African Mathematics Millennium Science Initiative (AMMSI), using LMS funding combined with funding from the International Mathematical Union Commission for Developing Countries (IMU CDC). The MARM programme aims to slow the movement abroad of talented African mathematicians due to lack of opportunities at home, which has a detrimental effect on the African mathematics people pipeline.

MARM links African academics with their UK and European counterparts via professional mentoring partnerships. In doing so, MARM provides the means and opportunities for African mathematicians to develop international working relationships while also improving the quality of academic provision within their home institution.

The Society believes that enhancing and developing academic research and research institutions in Africa will help ensure that pursuing first rank mathematical careers within Africa will be both achievable and a more attractive option.

EDUCATING THE MATHEMATICIANS OF THE FUTURE



Educating mathematicians of the future: maintaining the mathematics people pipeline.

The Society works on a number of different Education activities and continues to engage with government, mathematics education organisations and other learned societies in contributing to national policy discussions and decision-making processes across a wide range of major issues in both secondary and higher education.

A new LMS Education sub-committee, *Teaching Mathematics as a Career*, has recently been established which aims to formulate and implement the Society's response to the national shortage of suitably qualified mathematics teachers in the UK.

The LMS Education Committee also works closely with other mathematical groups and Societies, including the Royal Society's Advisory Committee on Mathematics Education (ACME), as well as the Joint Mathematical Council of the UK (JMC), Heads of Departments of Mathematical Sciences (HoDoMS) and the Higher Education Academy (HEA). In May 2019 an Education Day was held at De Morgan House and was attended by a number of representatives of these groups as well as representatives from UK universities. The event included

an update on subject-level Teaching Excellence Framework (TEF) and a presentation on teaching ethics in the mathematics curriculum, with further presentations and small group discussions on sharing practice.

This year the Society awarded 30 Mathematics Teacher Continuing Professional Development (CPD) grants, supporting the professional development of mathematics teachers and the improvement of mathematics teaching. These included two awards to organisers of mathematics conferences under the new Multiple Grants for Teacher CPD scheme, where organisers of regular mathematics education conferences can apply for grants to contribute to the travel/subsistence expenses of attendees at events.

The LMS continues to contribute to the Top-Top Set Maths Project, a pilot scheme that aims to maximise the potential of numerate and ambitious students by encouraging non-selective schools to create a 'top-top set' in every year group, which caters for the needs of the strongest and most motivated mathematics students.

CELEBRATING ACHIEVEMENT

The winners of the 2019 LMS Prizes were announced at the Society meeting on Friday 28 June 2019. The Society extends its congratulations to these winners and their significant research achievements, and would like to take the opportunity to thank 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

DE MORGAN MEDAL
Professor Sir Andrew Wiles FRS
(University of Oxford)



WHITEHEAD PRIZE
Dr Anders Hansen
(University of Cambridge)



SENIOR WHITEHEAD PRIZE
Professor Ben Green FRS
(University of Oxford)



WHITEHEAD PRIZE
Professor William Parnell
(University of Manchester)



NAYLOR PRIZE AND LECTURESHIP
Professor Nick Higham FRS
(University of Manchester)



WHITEHEAD PRIZE
Dr Nick Sheridan
(University of Edinburgh)



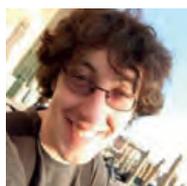
WHITEHEAD PRIZE
Dr Alexandr Buryak
(University of Leeds)



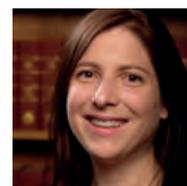
BERWICK PRIZE
Dr Clark Barwick
(University of Edinburgh)



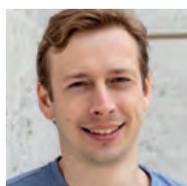
WHITEHEAD PRIZE
Professor David Conlon
(University of Oxford)



ANNE BENNETT PRIZE
Dr Eva-Maria Graefe
(Imperial College London)



WHITEHEAD PRIZE
Dr Toby Cubitt
(University College London)



LMS/IMA PRIZE
David Crighton Medal
Professor Ken Brown
(University of Glasgow)



ABEL PRIZE ANNOUNCEMENT

The 2019 Abel Prize was awarded to the US mathematician Professor Karen Uhlenbeck, Princeton University, for her ‘pioneering achievements in geometric partial differential equations, gauge theory and integrable systems, and for the fundamental impact of her work on analysis, geometry and mathematical physics’. Professor Uhlenbeck is the first woman to be awarded this prestigious honour.

Another first was the live screening of the announcement of the Abel Prize award to an audience at the Science Gallery in London, with the Society working in collaboration with the Norwegian Academy of Science and Letters, and the Norwegian Embassy in London. After the announcement, a panel including LMS President Professor Caroline Series FRS, former LMS President Professor Nigel Hitchin FRS, Professor Mark Haskins and Professor Peter Topping discussed the winner’s life and work. www.abelprize.no

A panel discussion on the life and work of Professor Karen Uhlenbeck. The panel from L to R: Professor Mark Haskins, Professor Peter Topping, Professor Nigel Hitchin and Professor Caroline Series.



CONNECTING WITH THE MATHEMATICAL COMMUNITY

In 2018-19 the Society has worked to support its membership and the wider mathematical community. Membership continues to increase and diversify, and the Society now has 3,400 members from 69 countries worldwide.

This year the Society was delighted to announce that, from 1 July 2019, it has a Reciprocity Agreement in place with the Irish Mathematical Society (IMS). This means that LMS Members who are not normally resident in the Republic of Ireland can now join, or renew their subscription to the Irish Mathematical Society and pay half the normal membership fee. LMS Members who are not normally resident in the United Kingdom, and who are also members of the Irish Mathematical Society, can now request a change in their membership type to Reciprocity member. Council also agreed that those who are both LMS and IMS members and are resident in Northern Ireland may choose to which Society they wish to pay the full membership fee and to which Society they would wish to pay the Reciprocity fee.

www.lms.ac.uk/membership

THE SOCIETY WITH GLOBAL REACH

The need to forge wider global relationships has never been more important for the mathematical community. To this end the Society works on behalf of its members through its own international initiatives and also with the European Mathematical Society (EMS), the International Mathematical Union (IMU) and its various sister Societies around the world to champion the role of UK mathematics. The Society's advocacy for mathematics in terms of the necessity for a broad range of experiences and skills helps to maintain the pre-eminence of mathematics as a truly global discipline.

LMS NEWSLETTER

Together with the e-Update the LMS Newsletter remains the cornerstone of communications with Society members and it is now three years since the redesign and launch of the new format publication. Each issue offers Society and member news, forthcoming events, reports, letters, and obituaries. It also includes a range of feature items, such as mathematical articles aimed at general mathematical readers, career development articles for early career researchers and reviews of books and events.

After three years at the helm the first Editor-in-Chief, Iain Moffatt, is standing down. The Society is grateful for the enormous amount of work he has contributed to get the new and expanded Newsletter successfully up and running. Over the past three years he has provided invaluable leadership and guidance to the current Editorial Board. His successor will be Eleanor Lingham (Sheffield Hallam University).



Two years since the first issue was published the redesigned LMS Newsletter continues to be well received.



1. Professor Caroline Series presents Professor Maria Esteban (Paris Dauphine) with her LMS Honorary Membership certificate.



2



3

2. 2018 Fields Medalist Professor Caucher Birkar, Professor Caroline Series and the late Sir Michael Atiyah in conversation at ICM 2018.
3. Professor Peter Scholze (University of Bonn) shows off his LMS Honorary Membership certificate

INTERNATIONAL CONGRESS OF MATHEMATICIANS

Some of the world's best mathematics researchers came together for the 28th International Congress of Mathematicians in Rio De Janeiro, Brazil in early August 2018. It was the first time the Congress had visited both Latin America and the Southern Hemisphere.

The Society was well represented by a delegation headed by the LMS President, Professor Caroline Series, who presided over the first ever LMS Meeting in the Southern Hemisphere, with a lecture by Marta Sanz-Solé. The President also presented certificates to LMS Honorary Members, Professor Peter Scholze (University of Bonn) and Professor Maria Estban (Paris Dauphine University)

The Congress was also a time of celebration for UK mathematics with Professor Caucher Birkar (University of Cambridge) receiving a Fields Medal for his 'proof of the boundedness of Fano varieties and for contributions to the minimal model program'.

ENGAGING AND INFLUENCING

Mathematical Science is the foundation of all science and data disciplines and a healthy research science sector relies heavily on the knowledge and skills of experts in the discipline. The Society continues to engage with government and other influential STEM organisations to ensure that levels of investment in UK Mathematical Sciences research and training meet the demand from new and existing industries.

MATHEMATICS LANDSCAPE REPORTS, CONSULTATION RESPONSES, AND LMS POLICY STATEMENTS

LANDSCAPE DOCUMENTS

Under its Research Policy Committee the Society holds a repository of data about the Mathematical Sciences and produces landscape reports providing data and analysis about issues affecting the Mathematical Sciences community. In 2018-19 reports were published regarding the pipeline of young researchers across the Mathematical Sciences and the important contribution of the Mathematical Sciences to economic prosperity.

- *2017 Survey of Postdoctoral Researchers in Mathematics Sciences in the UK*
<https://tinyurl.com/yyrh7fnv>
- *Mathematical Sciences: The Key to Economic Success*
<https://tinyurl.com/y3tuy55>



The Society landscape document surveying the number of Mathematical Sciences postdoctoral researchers in the UK.

CONSULTATION RESPONSES

During the year the Society also responded to a number of consultations and inquires from government and other organisations and updated one of its education policy statements to give the necessary weight and influence required to forward the Mathematical Sciences agenda.

The following responses were made under the LMS Education Committee:

- DfE, *Independent Review of Teaching Excellence Framework* (March 2019)
<https://tinyurl.com/yyvuakba>
- LMS Policy Statement Update, *Statement on Requirements for Facilities and Resources for Teaching Mathematics in HE* (October 2018)
<https://tinyurl.com/yy2jqbj7>

The following responses were made under the LMS Publications Committee:

- cOAlition S, *Guidance on the Implementation of Plan S (for full and immediate Open Access)*
<https://tinyurl.com/yf72egq5>
- Response to UKRI Open Access Review

THE BIG MATHEMATICS INITIATIVE (BMI)

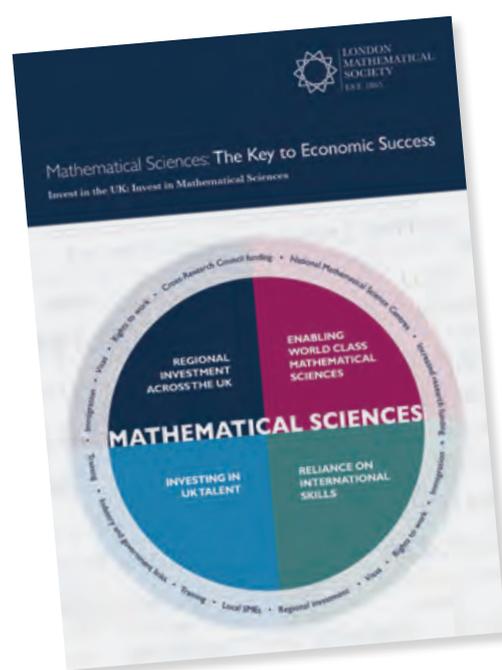
In 2018, Professor Philip Bond launched *The Era of Mathematics: An Independent Review of Knowledge Exchange in the Mathematical Sciences* (<https://tinyurl.com/yc8ykx4m>), at the House of Lords. This important and timely review set out the narrative and the vision for how the Mathematical Sciences knowledge exchange infrastructure could be transformed for the benefit of the UK research community and more broadly for the economy and for society.

The Council for the Mathematical Sciences (CMS), which comprises the main societies of the UK Mathematical Sciences community, met to discuss the review and its implementation. It agreed that to take forward the recommendations, a new initiative, now known as The Big Mathematics Initiative (BMI) should be established. This should consist of a two-committee structure comprised of first, a higher-level Strategic Committee of influential individuals with the experience and capability to drive forward the review with government, the National Academies and UKRI. Secondly, there should be an Implementation Group made up of those with direct experience of Mathematical Sciences and Knowledge Exchange; together these would work to take the recommendations forward.

Dr Claire Craig and Professor Sir Bernard Silverman were appointed to chair the Strategic Committee and Implementation Group respectively, and during the course of the summer the Implementation Group was commissioned by the Strategic Group to develop specific evidence, ideas and proposals with a view to producing an implementation plan for the findings and recommendations of the review. It is anticipated that this will be presented to the Council for the Mathematical Sciences in Spring 2020.

LMS 2019 SPRING RECEPTION

Every other year the Society holds a Spring Reception which is kindly hosted by one of the Society's sponsors, Dr Richard Golding. This is an event bringing together people of influence in the many diverse fields and industries for which the mathematical sciences provide a foundation, alongside policy makers and political leaders, to initiate conversation looking to the future of mathematics. The 2019 Spring reception focused on developing and growing the Mathematical Sciences research talent in the UK and for which the LMS produced an accompanying document *Mathematical Sciences: The Key to Economic Success*. In addition Dr Claire Craig, Chair, The Big Mathematics Initiative (BMI), spoke about the aims of the BMI in taking forward the recommendations of the Bond Review, which was followed by a lively debate. The reception is a high profile networking event providing a crucial opportunity for those in the Mathematical Sciences to meet key policy makers and those from industry.



The Society landscape document presented to 2019 Spring reception delegates, highlighting the economic benefits of the Mathematical Sciences.



The Mathematical Sciences award winners at STEM for Britain 2019. L to R: Francesca Crucinio, Kristian Kiradjiev and Marina Jiménez-Muñoz.

EVENTS IN PARLIAMENT

The Mathematical Sciences was represented in Parliament for a sixth year in the *STEM for Britain* poster competition where a range of talented early career researchers displayed their high-quality research to MPs. Kristian Kiradjiev was awarded Gold for his research on *Mathematical Modelling of Flue-gas Purification*, Marina Jiménez-Muñoz won Silver for her research on *Spatially-explicit Integrated Population Models Applied to Bird Populations* and Francesca Crucinio won Bronze for her research on *Sequential Monte Carlo for Fredholm Equations of the First Kind*.

As well as participating in the important STEM for Britain competition the Society, under the auspices of CMS, also supported both *Parliamentary Links Day* and *Voice of the Future*.

Parliamentary Links Day remains one of the largest and longest running science events in parliament, bringing together researchers, policymakers and sector leaders to discuss the future of science.

Two panels discussed this year's theme of *Science and New Frontiers*, with keynote speeches from Chi Onwurah MP, Shadow Minister for Industrial Strategy, Rt Hon Sir Norman Lamb MP, Chair, House of Commons Science and Technology Select Committee and Chris Skidmore MP, Minister of State for Universities, Science, Research and Innovation. Among other issues the panellists discussed how science policy might change to boost success in UK science and how money should be spent if research funding rises.

The Society once again nominated several early career Mathematical Sciences researchers to take part in *Voice of the Future*. The event gave these young and early career mathematicians the opportunity to question MPs and Ministers about the future of STEM.

EQUALITY AND DIVERSITY

The Society continues its commitment to improving the proportion of women in mathematics and to help ensure that equality and diversity are embedded within working practices for the benefit of everyone working and studying in the UK mathematics community.

WOMEN IN MATHEMATICS

A major piece of work undertaken by the LMS Women in Mathematics Committee and Good Practice Scheme Steering Group involved producing an update of the 2013 Benchmarking Survey commissioned from Ortus Economic Research. The goal of the report was to understand the current status of women in UK mathematics departments, as well as to understand the experience that departments have had with the Athena Swan process. The report (<https://tinyurl.com/yx9jyznf>) is based on an analysis of three different types of data: HESA data on proportions of women at various levels in UK HEI mathematics departments, Athena Swan applications contributed by 33 UK mathematics departments and interviews with eight individuals involved with the Athena Swan process in their departments.

The report has been able to provide some evidence through comparing types of actions undertaken with percentages of female staff in departments. The report highlights both the difficulty of individual departments in understanding the effectiveness of current practices and the need for national benchmarking and discussion to continue to build a picture of what practices are successful in improving representation and experiences of women in mathematics.

On the whole, the exercise has brought to the attention of departments around the UK important concerns about the participation and experience of women in mathematics and given an impetus for change that we would not like to see diminish. However, as the work nationally on gender equality develops, the Athena Swan mechanism itself will require some changes.

DIVERSITY IN MATHEMATICS

As well as continuing with its successful programme of Women in Mathematics and Girls in Mathematics events, in 2019 the Society launched a new initiative, *Diversity in Mathematics Days*, which has been set up to support aspects of diversity beyond gender. Each annual event is expected to focus on an individual aspect of diversity in the Mathematical Sciences, whether in industry or academia, and to offer opportunities for mathematicians from that diversity group to receive mentoring, and networking opportunities. <https://tinyurl.com/ygdzflw2>

In 2019 the Society also committed financial support to the 2020 LGBT STEMinar, which will be held at the University of Birmingham. This project showcases LGBT people in areas of STEM, showing the diversity that can be found in roles across all STEM disciplines and hopefully providing some role models for those who are either at a junior stage in their careers, or who are only currently considering the possibility of going into a STEM field. <https://tinyurl.com/yjl7dywo>

The Society also continues to operate its Caring Supplementary Grants and Grace Chisholm Young Fellowship schemes.



Students working at an LMS Girls in Mathematics Day, Bishop Grosseteste University, Lincoln

GETTING THE MESSAGE ACROSS

During 2018-19 the Society continued to promote its events and activities to the wider mathematical community. The Society's social media presence is developing and growing, with the combined number of followers across its two Twitter accounts (@LondMathSoc and @womeninmaths) standing at 24,000. This widening digital footprint and regular

electronic communication to members is working in tandem with the LMS Newsletter, helping to extend the Society's reach in promoting its events and activities and the broader 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 <http://tinyurl.com/n849jv4>

POPULAR LECTURES

The 2018-19 LMS Popular Lectures were held at the Institute of Education, London and the University of Birmingham. The audiences enjoyed an evening of mathematics with a journey through a life in mathematics, and a look at the complexity of the human brain and some of the basic principles at work in shaping our brains.

Profess Peter Higgins (University of Essex) took the audience through his personal mathematical journey, going back to his roots and recounting personal episodes that led to him becoming a professional mathematician. He went on to tell the story of how he invented circular Sudoku. Higgins recognised from his work that the knowledge he had accumulated could be applied to mathematical problems in this

case relating to Burrows-Wheeler transform, which is an algorithm that rearranges character strings into runs of similar characters and is important in data compression.

Professor Alain Goriely (University of Oxford) presented the second lecture on the structure of the brain. The outer surface of the brain (cerebral cortex) is very convoluted so that a maximum amount of gray matter (brain neurons) can fit inside the skull, but how do these convolutions emerge and how is the brain's geometry related to function? In essence he showed how some of the basic principles at work in shaping the brain can be explained using geometry, scaling laws and network topology.

The audience engaged enthusiastically with the presentations and the lectures were very well received.



1



2



1. Peter Higgins discusses his life in mathematics.

2. Alain Goriely takes the audience on a mathematical journey through the structure of the brain.

WORKING WITH OTHERS TO PROMOTE MATHEMATICS

The Society once again collaborated with other institutions and STEM organisations to promote mathematics to a more general audience by producing *Maths Inside* leaflets for the Royal Society Summer Science exhibition in collaboration with academics from around the UK. The *Maths Inside* project has now been running for over 10 years and is one of the Society's most popular outreach activities. <https://tinyurl.com/yh5a7ycy>

The Society also assisted in developing the mathematics programme for the British Science Festival, which was held in Coventry and Warwickshire, and the joint LMS/Gresham College Lecture at the Museum of London. This year's Gresham Lecture was presented by Professor Helen Wilson (UCL) entitled *Toothpaste, Custard and Chocolate: Mathematics Gets Messy*. <https://tinyurl.com/y2zgd897>



Maths Inside 2019: *Driverless Cars, What would you say to an Alien?* and the *Mathematics of Cancer*.



LONDON
MATHEMATICAL
SOCIETY
EST. 1865

The London Mathematical Society
De Morgan House
57-58 Russell Square
London WC1B 4HS

www.lms.ac.uk

The London Mathematical Society is incorporated under Royal Charter and is a
Charity registered with the Charity Commissioners. Registered number: 252660.
Design: touchpointdesign.co.uk