THE LONDON MATHEMATICAL SOCIETY
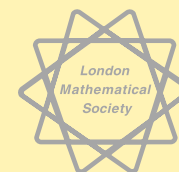
NEWSLETTER

Forthcoming Society Meetings

2007

Friday 9 February
London
P. Maini
A. Stevens
(Mary Cartwright Lecture)
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Friday 20 April
Midlands Regional Meeting
Loughborough
Y. Colin de Verdière
F. Kirwan
O. Viro

Wednesday 30 May
SW and South Wales Regional Meeting,
Cardiff

Friday 22 June
London

Thursday 25 October
Northern Regional Meeting
Sheffield

Friday 23 November
AGM, London
Presidential Address

ANNUAL REPORT ON ACTIVITIES

In previous years, the Society's Annual Report has comprised a mixture of formal elements required by law combined with an update on the Society's activity, arranged according to the Committee that runs the activity. However, new rules from the Charity Commission (known as SORP 2005) require the Society to produce a 'Trustees' Report' according to a set of very specific guidelines, mapping each activity to one or more of our charitable objectives. The Trustees' Report for 2005/06 and audited accounts were approved at the November Council meeting and are now available on the Society's website and on request from the Administrator, Susan Oakes, at De Morgan House.

However, the formal style of the Trustees' Report is not necessarily one that would be immediately suitable for wider consumption. Specifications placed on the structure and content of the Trustees' Report result in a formal document rather than a report that could be used to communicate what the Society does.

This year, an *Annual Report on Activities* has been created to provide an accessible account of the year's activity, aimed at members and designed for more general use. This report focuses on the activities undertaken in our financial year 1 September 2005 – 31 August 2006, and has been assembled from summaries provided by the Chair of each of the Society's Committees.

As with the Trustees' Report, the ARA is now available to view online (www.lms.ac.uk/policy) and hard copies are available on request from the Administrator, Susan Oakes, at De Morgan House. As this is a trial run of the format, the Finance and General Purposes Committee is keen to gauge whether members would wish to have hard copies posted to them by default on an annual basis; you are invited to submit your views on this to president@lms.ac.uk.

Copies have been sent to each UK mathematics department for 'coffee table' use; it is hoped that the production of the ARA will give everyone a chance to find out about the very broad range of activities that the Society undertakes in order to advance, disseminate and promote mathematical knowledge.

Martin Smith
Administrative Officer (Council)

LONDON MATHEMATICAL SOCIETY

2006-07 Council

As a result of the annual election, membership of the Council is the following:

President	Professor J.F. Toland FRS, FRSE (Bath)
Vice-Presidents	Professor D.G. Larman (University College London)
	Dr F.A. Rogers (King's College London)
Treasurer	Professor N.M.J. Woodhouse (Oxford)
General Secretary	Professor C.M. Goldie (Sussex)
Programme Secretary	Dr S.A. Huggett (Plymouth)
Publications Secretary	Professor K.J. Falconer FRSE (St Andrews)
Education Secretary	Professor C.J. Budd (Bath)
Members-at-Large	Professor A.V. Borovik (Manchester)
	Dr D.E. Buck (Imperial College London)
	Professor S.N. Chandler-Wilde (Reading)
	Professor R.T. Curtis (Birmingham)
	Professor H.G. Dales (Leeds)
	Dr P.J. Davies (Strathclyde)
	Professor A.M. Etheridge (Oxford)
	Dr I.G. Gordon (Glasgow)
	Sir John Kingman FRS (Isaac Newton Institute)
	Professor R.M. Thomas (Leicester)
	Professor A.J. Wilkie (Oxford)
	Dr E. Winstanley (Sheffield)

TREASURER'S REPORT TO THE AGM 2006

In the financial year 1 September 2005 to 31 August 2006, the Fixed Assets of the Society increased in value from £11.4m to £12.3m. This was the first full year in which the Society's investments have been managed by Morgan Stanley. The new managers have been set the target of producing a real return of at least 4% pa. The management of the portfolio conforms with the Trustee Act.

The Society drew on the Building and Development Reserve Fund to pay for the refurbishment of the basement of De Morgan House, and will replenish the reserve at the rate of £60,000 pa over the next few years. It now stands at £260,000 (reduced from £441,852 at the beginning of the year); the Printing and Publication Reserve Fund is unchanged at £1.20m. Other reserve funds are used to hold gifts and bequests to the Society (£23k, unchanged on last year), to meet the costs of grants that have been awarded but not yet claimed (£106k), and to separate *Compositio* from other publishing activities (balance transferred at the end of the year).

The accounts have been restructured in compliance with the new standard, SORP 2005. Support costs are now attributed to the different sectors of activity. For comparison purposes, last year's accounts have been restated in the new format. Support costs include staff costs, office and building costs, and IT. The total in the financial year was £728k, a small rise on last year's figure of £704k (restated). The main contribution to the rise was in the costs of the new conference facility, offset by falls elsewhere. The conference facility provides a much improved environment for the Society's work in promoting mathematics, as well as providing a new income stream.

It has been another good year for the Society's publishing activities, which generated a surplus of £726k (against £679k, restated, last year). Again I should draw attention to the essential role that the publications' surplus plays in enabling the Society to support mathematical activity in the United Kingdom, and congratulate the Publisher Susan Hezlet for the energetic and forward-looking way in which she pursues the Society's interests. Council continues to be concerned about the implications of proposed changes in scientific publishing and their potential impact on the financial health of then Society.

The total spent on grants fell from £253k (restated) to £246k, the main contribution being a small fall of £10k in Programme Committee grants. These figures are the totals paid out during the year, not the totals awarded. There is some delay between awarding grants and paying them, so the figures in the accounts to some extent reflect the decisions of the Committee in the preceding financial year.

Total membership fell slightly from 2572 to 2542, the drop being almost entirely in the number of Associate members. Subscription income rose from £61k to £65k.

Once again, there are no dramatic changes to report. I again acknowledge the enormous contribution that Susan Oakes and Peter Cooper make to the orderly conduct of our affairs, and particularly the contribution of Ephrem Belay, who bore the brunt of the introduction of SORP 2005, and saw through the induction of our new auditors, Kingston Smith LLP.

N.M.J. Woodhouse
Treasurer

LONDON MATHEMATICAL SOCIETY

MARY CARTWRIGHT LECTURE

Friday 9 February 2007
University College London

3.30 – 4.30   P. Maini (Oxford)
Emergent Phenomena – Fact or Fiction?

4.30 – 5.00   Tea

5.00 – 6.00   A. Stevens (Leipzig)
Mary Cartwright Lecture
Interacting Cell Systems: An Example for
Mathematical Modelling in the Life-Sciences

There are limited funds available to contribute in part to the expenses of members of the Society or research students to attend the meeting. Contact Isabelle Robinson (robinson@lms.ac.uk) for further information.

A reception will be held at De Morgan House at 6.15pm with a dinner afterwards at the Il Fornello Restaurant, 150 Southampton Row, London WC1 at 7.00 pm. The cost will be £20.00 per person, inclusive of wine. Those wishing to attend should inform Susan Oakes, London Mathematical Society, De Morgan House, 57-58 Russell Square, London WC1B 4HS, enclosing a cheque payable to the 'London Mathematical Society' to arrive no later than **Monday 5 February**.

NEWS FROM THE IMU

Editorial

Dear Reader,
2006 was an eventful year for mathematics, a year which saw the very successful International Congress of Mathematicians in Madrid, together with the extraordinary mathematical story, that touched people worldwide, of Grigori Perelman and the Poincaré conjecture.

To all those who worked to make the ICM such a great occasion and anyone who has organized a big event will know that the work does not stop when the last participant says goodbye the world of mathematics owes an enormous debt of gratitude. Everyone, from His Majesty King Juan Carlos to the student helpers, played their part admirably, and one should not forget the families who supported those who worked long hours to bring the Congress into being.

I myself owe much to those who have advised and sustained me as President of IMU over the last four years. The IMU Executive Committee has been terrific, and I thank especially for their dedicated service those who will soon leave it – Jacob Palis, Phillip Griffiths, Jean-Michel Bismut, Masaki Kashiwara and M.S. Raghunathan. Linda Geraci has been splendid as IMU Administrator, and the IMU accountant Linda Lee has provided valuable financial advice. I am also especially grateful to Herb Clemens, who has been a wise pilot through the often uncharted waters of promoting mathematics in developing countries. Last, but certainly not least, my own family has been a constant support despite a substantial work load and long absences due to foreign travel.

I was particularly happy that one of my last duties was to travel to Japan to present the first Carl Friedrich Gauss Medal to Professor Kiyosi Itô, who on account of his advanced age could not come to Madrid to receive the award. His work, conceived in terms of mathematical structure, but having profound implications for the world in which we live, epitomises for me the irrationality of drawing an artificial distinction between pure and applied mathematics. Professor Itô has generously donated his prize money to IMU in support of young mathematicians (see www.mathunion.org/General/Prizes/2006/).

To the new IMU President László Lovász, the incoming IMU Executive Committee, and all those who now begin to organize ICM 2010 in Hyderabad, I wish every success for their important work for our community.
With my best wishes to all,
John Ball

News from the Developing Country Study Group

IMU has received its third major grant from the Niels Henrik Abel Memorial Fund towards its 2006 activities in sustaining and promoting mathematics and mathematicians in developing countries.

In addition to enabling us to continue our efforts in supporting mathematics and mathematics education in Africa, this grant makes it possible for us to lay the groundwork for longer term collaboration with the Centre International de Mathématiques Pures et Appliquées (CIMPA) and International Commission on Mathematical Instruction (ICMI) in Indo-China projects. This work necessarily involves both mathematics research and mathematics education because of the vastly different situation of mathematics in the countries involved. A current activity supported by the Developing Country Study Group (DCSG) is the participation of teachers from Cambodia and Thailand in ICMI's Study 17 Conference and Workshop taking place in Hanoi, Vietnam, during 3–12 December, intended to build bridges and enhance CIMPA's ongoing efforts to rebuild the mathematical infrastructure in Cambodia in cooperation with other countries in the Southeast Asia region.

Within the framework of our Nuffield project, three mentorships between UK mathematicians and mathematics departments in

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sub-Saharan Africa have recently been activated, one in Cameroon, one in Ethiopia and one in Ghana. A second round of calls for expressions of interest in mentorships, within the framework of both our Nuffield and Leverhulme projects, is currently being prepared. In the same spirit as these projects, the US National Committee on Mathematics is supporting a senior US mathematician to do visiting lectureships and mentoring visits to Benin and to Senegal in early 2007. This activity is again being coordinated through DCSG.

In August, the IMU General Assembly indicated its approval for the expansion of IMU's work in the developing world which has occurred over the last four years. It endorsed a proposal to the incoming IMU Executive Committee to merge DCSG and IMU's historical Commission on Development and Exchanges into a single body, to be called the IMU Commission for Developing Countries (CDC). CDE would be reconstituted as a committee within the Commission for Developing Countries, called the Grants Committee, and would carry out its traditional programs of support for individual research travel and conferences in developing countries within the framework of the new CDC's overall goals and activities.

(The above items are taken from the 20th issue of the IMU electronic newsletter IMU Net see: www.mathunion.org/ Publications/Newsletter).

LONG-STANDING MEMBERS

The following is a list of mathematicians who have completed fifty years or more of membership of the London Mathematical Society, with their date of election.

8 Feb 40	Kendall, D.G.	17 Mar 49	Kilmister, C.W.	18 Feb 54	Cohen D.E.
17 Dec 40	Good, I.J.	28 Apr 49	Austin, M.C.	18 Feb 54	James I.M.
17 Mar 43	Dyson, F.J.	19 Jan 50	Shepherdson, J.C.	17 Jun 54	Taylor S.J.
15 Jun 44	Williams, A.E.	16 Feb 50	Lehner, J.	25 Nov 54	Amson J.C.
25 Jan 45	Ollerenshaw, K.	23 Mar 50	Ponting, F.W.	25 Nov 54	Halberstam H.
25 Jan 45	Collard, K.	14 Dec 50	Patterson, E.M.	16 Dec 54	Preston G.B.
17 May 45	Henstock, R.	19 Apr 51	Chen, D.L.C.	27 Jan 55	Atiyah M.F.
28 Jun 45	Tropper, A.M.	17 May 51	Roth, K.F.	24 Feb 55	Rayner F.J.
25 Apr 46	Rothman, M.	14 Jun 51	Jackson, M.	24 Mar 55	Farahat H.K.
23 May 46	Huppert, E.L.	14 Jun 51	Ledermann, W.	12 May 55	Murdoch B.H.
23 May 46	Rees, D.	20 Dec 51	Herszberg, J.	12 May 55	Wall G.E.
19 Dec 46	Higman, G.	20 Dec 51	Dowker, Y.N.	12 May 55	Harrop R.
16 Jan 47	Macbeath, A.M.	17 Jan 52	Wilson, D.H.	15 Dec 55	Armitage J.V.
20 Mar 47	Hayman, W.K.	15 Feb 52	Shephard, G.C.	15 Dec 55	Butler M.C.R.
22 May 47	Ghaffari, A.	20 Mar 52	Bonsall, F.F.	15 Dec 55	Newman M.
19 Jun 47	Cassels, J.W.S.	20 Mar 52	Swinnerton Dyer, H.P.F.	19 Jan 56	Bowers J.F.
27 Nov 47	Hilton, P.J.	20 Nov 52	Knight, A.J.	15 Mar 56	Edmunds D.E.
18 Mar 48	Burkill, H.	18 Dec 52	Reeve, J.E.	15 Mar 56	Horrocks G.
18 Mar 48	Isaacs, G.L.	18 Jun 53	Rayner, M.E.	19 Apr 56	Penrose R.
18 Mar 48	Reade, M.O.	18 Jun 53	Marstrand, J.M.	14 Jun 56	Perry R.L.
17 Jun 48,	Bateman, P.T.	17 Dec 53	Ringrose J.R.	14 Jun 56	Noble M.E.
18 Nov 48	Mullender, P.	17 Dec 53	Gruenberg K.W.	14 Jun 56	Collins W.D.
13 Dec 48	Fishel, B.	17 Dec 53	Samet P.A.	15 Nov 56	Edwards D.A.
20 Jan 49	Borwein, D.	21 Jan 54	Zeeman E.C.	13 Dec 56	Kalman J.A.

EPSRC MATHEMATICAL SCIENCES STRATEGIC ADVISORY TEAM (SAT)

The Maths SAT met on 10 October 2006 at Alexandra House, Wroughton.

The first item on the agenda was an update on Programme Investment Planning. Previously, the SAT had generated ideas for future priorities and activities for the Mathematical Sciences Programme and some members had participated in an all-SATs meeting at which EPSRC-wide portfolio investment priorities had been considered. Since these meetings, EPSRC had developed its strategic framework and draft delivery plan further with input from the Technical Opportunities Panel, User Panel, Societal Issues Panel and Council. The EPSRC strategic framework was presented to the SAT, together with the priorities for the Mathematical Sciences Programme for 2007-08. These include responsive mode, training, fellowships, statistics capacity building and a bilateral collaboration with France. Understanding the research needs at the interface with High Performance Computing and at the mathematics/biology interface are also topics for future focus. In terms of non-grant activities, the Programme team will review the Doctoral Training Grants allocations process, work to enhance our relationship with early career researchers and will continue to collaborate with other European Funders of Mathematical Sciences with a focus on those at the start of their academic careers. The SAT was updated with the plans for *Engaging Maths*, the showcase event for politicians and other opinion formers to be held in February 2007 at the House of Commons.

The SAT also received a review of the actions and investments made by EPSRC following the International Reviews of Mathematics and Operational Research. The SAT was highly supportive of the recent announcements of 5 taught course centres for PhD students in the mathematical sciences and were interested to see where the level of training would settle. The contract for short courses in the Mathematical Sciences had also recently been let to the LMS and it will be very important to ensure that these courses both complement the other available training and evolve to meet the training needs of UK PhD students as the landscape changes. Discrete mathematics and algorithms at the computer science interface was highlighted as an area where more specific actions may be required and it was noted that relatively little earmarked resource had been directed at mid-career academics.

The SAT then discussed early career academics in the Mathematical Sciences. It is important to invest in these researchers because they are the future of academic research in the UK. SAT members were briefed on current EPSRC provision for such researchers and some of the issues relating to funding through postdoctoral fellowships, responsive mode and engagement with EPSRC. SAT members then talked about how best to support early career academics. It was noted that there are different types of early career researchers needing different types of support. Postdoctoral fellowships and research assistantships were both felt to be important in initiating academic careers. The importance of an environment in which it is easy to conduct research was highlighted, this might be characterised by 'open doors', informal seminars, reduced teaching and administrative loads, encouragement of broad research programmes, opportunities to teach interesting courses, good mentoring, available travel funds and opportunities to co-supervise PhD students before supervising them alone. The SAT was brought up to date on the Programme's plans for a series of regional meetings aimed at early career academics in Spring 2007 and suggested items that might usefully be included as part of those events.

There followed a short discussion about Maths at the Bioscience Interface, prompted by earlier discussion at both the Mathematical Sciences Programme and Life Sciences Interface (LSI) SATs. The team agreed that this was an important area but that further development of new mathematics for biology would take some time. It was noted that it is essential to create an environment in which excellent people would want to conduct research in this area, and to bring together researchers across the spectrum of mathematics and biology to identify research questions that require new mathematics. The existing mathematical biology community were felt to be important in these discussions because they have already developed the skills required to talk to biologists – they are 'bilingual' researchers. Notes of this discussion were passed to the LSI SAT for their meeting in November and future action would be planned following the outcome of that meeting.

Finally, the SAT was brought up to date on plans to review the Doctoral Training Grant Allocations process to ensure that it is still fit for purpose. A useful and wide ranging discussion followed in which some of the advantages and disadvantages of Doctoral Training Accounts were identified. A number of issues were raised, especially relating to measuring the level of research activity within the department and measuring the quality of training that a department can provide. It was felt that there was a critical level of teaching quality below which departments do not offer a good training environment, and that generally size was a multiplier of quality factors rather than a performance indicator. These and other points will be incorporated into our thinking and will feed into further discussions about the DTA allocations process in the mathematical sciences.

Retiring SAT members were thanked for their contributions to the Programme and we look forward to welcoming a number of new members to the team in the New Year. From 1 December 2006 the EPSRC Programme Manager for Mathematical Sciences will be Mr David Harman; David or any other member of the Programme team would be happy to receive your feedback on these or any other issues affecting the UK Mathematical Sciences community.

Dr Annette Bramley
EPSRC Programme Manager,
Mathematical Sciences

SPITALFIELDS DAY

There will be a Spitalfields Day on Monday 26 March at the Mathematics Institute of the University of Warwick, on the first day of a workshop on *Geometric Flows and Related Topics*. The speakers will be:

- Gerhard Huisken (Max-Planck 'Albert Einstein Institute', Golm)
- Bruce Kleiner (Yale)
- William P. Minicozzi II (Johns Hopkins)
- Richard Schoen (Stanford)

The organiser is Peter Topping. The workshop is part of a year-long symposium on *Low Dimensional Geometry and Topology* organised by Caroline Series.

JANUARY DEADLINES

Friday 12th
LMS prizes nominations:
De Morgan Medal, Senior Whitehead, Berwick, Whitehead, Naylor

Wednesday 31st
LMS annual subscription payments
Scheme 1-5 grant applications

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THE BOLOGNA PROCESS AND MASTER'S COURSES IN THE MATHEMATICAL SCIENCES

The Council for the Mathematical Sciences (CMS) set up a working group under the chairmanship of Brian Stewart to report on the future of Master's and Integrated Master's degrees and this report was approved by the CMS in November. What follows is the executive summary; for the full report including conclusions and recommendations see www.cms.ac.uk.

Overview of the Process

The Bologna Process is a key tool within the European Higher Education Area (EHEA) and seeks to put into effect the original Bologna Declaration of 1999. An overarching Framework for Qualifications within the EHEA forms part of this process. Closely related is the development of the European Credit Transfer System (ECTS).

The Process recognises and defines First Cycle, Second Cycle and Third Cycle qualifications – what in the UK would generally be seen as Bachelor's Degrees, Master's Degrees and Doctorates. The definitions include many references to Learning Outcomes and to ECTS credits.

Overview of Master's Courses in Mathematical Sciences

Within the UK, Master's level qualifications in the mathematical sciences include Integrated Master's courses of MMath type which are enhanced undergraduate courses that typically take one more year to complete than a standard Bachelor's degree; and postgraduate courses of MSc type which are commonly of one calendar year (FTE) in duration. Courses of both these types are of great importance within the mathematical sciences in providing sources of well qualified people trained to substantially beyond the normal First Cycle level,

well equipped both to enter employment and to go on to further study. It is vital that such courses meet international standards so that UK graduates are readily acceptable in other countries. Compliance may need some amendments to course design, but it is imperative that generic interpretations of the requirements for compliance evolve in such a way as not to cause unfortunate subject specific consequences.

UK and European Credit Systems

In the UK, the Credit Transfer and Accumulation Scheme (CATS) is widely used to measure credit. It appears that there is agreement on an operational level that one ECTS credit is equivalent to two CATS credits. Thus a full time academic year is reckoned as 60 ECTS credits and 120 CATS credits. Nevertheless, there are some inconsistencies in using this as a formal rate of conversion. Notably, it is current practice to represent a full time postgraduate year of study (i.e. a calendar year) by 180 CATS credits; but current ECTS guidelines are that 52 weeks of full time study with no holidays would give 75 ECTS credits. This has important consequences for postgraduate courses.

Learning Outcomes

The UK has generally welcomed the development of Learning Outcomes as course descriptors, rather than relying solely on numerical credits; this approach should be supported. Nevertheless, as with credits, there are some current inconsistencies between different statements of Learning Outcomes. A particular difficulty in the mathematical sciences is the tendency for some statements to insist that M level work includes some 'which is at the forefront of knowledge in a field of work'. This is wholly unrealistic and must be strongly resisted. Statements to the effect that M level work 'is informed by the forefront' are entirely acceptable, as are statements in which the concept of 'research' is given a broad meaning. On that basis, current Master's courses in the mathematical sciences (both MMath and

MSc type) broadly meet the descriptors of Learning Outcomes for the Second Cycle.

Implications for Integrated Master's Courses
In terms of credits, and using the 1 ECTS = 2 CATS exchange rate, Integrated Master's degrees offer 240 ECTS = 480 CATS credits: four academic years at 60 ECTS or 120 CATS each. (The obvious amendments need to be made to describe the situation in Scotland.) As would be expected, this is 60 ECTS (120 CATS) above the minimum required for a First Cycle qualification. This is insufficient to merit a separate Second Cycle qualification on the basis of a typical value often quoted as 90 ECTS (180 CATS). However, there is a sound argument that the integrated nature of these courses implies that they should not be viewed as separate First and Second Cycle programmes – indeed, there is often no clear break point between the two cycles in these courses – and on that basis the total number of credits is ample. Further, there are some documents which could be interpreted as indicating that 60 ECTS (120 CATS) is sufficient anyway. Arguments that the final academic year should be extended to a calendar year by teaching in the summer vacation (either before or after it) must be resisted. This would militate against research activity in departments that by their nature are research intensive, and there would be no funding available to support the students. A smaller issue is to ensure that there should be at least 60 ECTS (120 CATS) of M level material. This is fully accepted as necessary, commonly exists already and will be easy to implement if there are cases where it does not.

'Badging' of Integrated Master's degrees presents many problems unless a form of combined award is given so as to indicate that the recipient has achieved both a First Cycle and a Second Cycle qualification. This is best done by a dual award (such as BSc, MMath). Uniformity of practice between institutions is highly desirable.

Implications for postgraduate courses
For postgraduate courses (i.e. courses of MSc type), the usual UK practice is to offer a one year programme containing 180 CATS credits with at least 120 at M level. This is compliant with the Bologna Process where a Second Cycle qualification typically requires 90–120 ECTS credits with at least 60 at M level – unless cognisance is taken of the apparent limitation of a full calendar year to only 75 ECTS credits. Clarification of this issue is urgently needed.

Funding the Second Cycle
Funding for students taking Master's level qualifications is problematic. For Integrated Master's courses, real difficulties now arise with the extra fees to be paid and loans needed for the additional year. For postgraduate courses, there is normally no funding available for students at all – and yet, from the students' perspective, these courses share many of the characteristics of First Cycle courses. Issues of ensuring a sufficient supply of well qualified graduates, and of fair access to courses, demand urgent consideration, and this must be at government level.

Impact on Doctoral Study
Finally, for those who will proceed to Doctorates, there is the key factor of the total length of time from leaving school to submission of the thesis. There is now a consensus that 8 years should be the norm in the mathematical sciences. This can be split in various ways: 4+4 as MMath + four years Doctoral studies; 3+1+4 as BSc + MSc + four years; and others. A different model of 3+2+3 (BSc + two year MSc + three years Doctoral) seems likely in many European countries. This last model would be very damaging to the future of MMath courses and highly unattractive to UK students if they had to fund themselves for two years of an MSc course. The importance of proper funding structures is again evident. It is also important that some flexibility of approach to the organisation of Doctoral study be maintained.

WOMEN IN MATHEMATICS DAY 2007

The next Women in Mathematics Day will be held on **27 April** at De Morgan House. Sessions will include talks by practising women mathematicians in a variety of appointments and at different career stages.

The organisers would be very grateful if all members could encourage women mathematicians, particularly students (including final year undergraduates) and those at an early stage in their career, to attend this meeting. It is hoped that an opportunity to see women who are active and successful in mathematics, and to meet them informally will be beneficial. Feedback from previous meetings has shown that participants find this useful. While this is an occasion particularly for women active in mathematics to get together, men are certainly not excluded.

Any postgraduates, postdocs or research assistants interested in giving a talk during the afternoon session should contact Dorothy Buck (d.buck@imperial.ac.uk).

Draft Programme

10.30-11.00	**Registration and coffee**
11.00-12.45	**Morning Session**
	Professor Caroline Series (Warwick) *Continued Fractions and Hyperbolic Geometry*
	Professor Nancy Nichols (Warwick) *The Weather Modelling Problem*
	Dr Sarah Waters (Nottingham) *Mathematical Methods in Virology*
12.45-13.45	**Lunch**
13.45-16.00	**Afternoon Session**
	Postgraduate/Postdoc speakers
16.00-16.30	**Tea**

Followed by an early evening meal for those able to stay.

Limited funds are available to help with the travel costs of students attending the event. Further details are available from Isabelle Robinson at the Society (contact details below).

To register contact Isabelle Robinson, Administrative Officer (robinson@lms.ac.uk). The day is free for students and £5 for all others – payable on the day.

COUNCIL FOR THE MATHEMATICAL SCIENCES DIARY

Autumn 2006

The Council for the Mathematical Sciences (CMS) met in De Morgan House on 2 November, with Professor Sir David Wallace CBE FRS FREng as the new independent Chair. The appointment of a Chair who was independent from the three societies was just one of moves to enhance and make CMS more effective agreed by the societies in June 2005.

The meeting considered a draft 'Business Plan', which proposed an ambitious programme of activities for the following year, matched against its strategic objectives. Actions included seeking meetings with several key policy makers and influencers, alongside the continuing 'reactive' responses to consultations.

The latest of these submissions includes Research Council UK's consultation regarding how peer review could be made more effective and efficient. The importance of preparing a good response to such requests is well understood; following a CMS statement on the DfES-DTI STEM Programme Report the CMS was pleased to note that concerns regarding the lack of representation of mathematics on the Science, Engineering, Technology and Mathematics (STEM) Strategy Group have now been addressed. Other recent submissions include a robust response to the consultation on a 'metrics-based' Research Assessment Exercise.

Another item of great interest to the meeting was the approval of the final report of the Bologna Group. The CMS was very grateful for the Group's work on this important issue and will be taking this report forward to the relevant people in Government. The full report appears on the CMS website. The CMS Bologna group will continue to monitor this crucial issue in 2007.

The meeting expressed ongoing concerns regarding the introduction of a two-GCSE structure for mathematics, and received an update from the Advisory Committee for Mathematics Education (ACME) following its workshop on Functional Mathematics and Specialised Diplomas in October. The CMS recognizes ACME's role in speaking for mathematics education in England, and will be liaising closely with ACME to ensure that a coherent and consistent message is presented.

With the matter of an independent chair now completed the CMS looked at other aspects of the planned enhancement, including how the CMS engages with stakeholder organisations and other bodies in the wider mathematical community. In the first instance, invitations were issued to the Operational Research Society and the Edinburgh Math-ematical Society to send a representative to the next two CMS meetings, with the intention that CMS would discuss the issue of membership after that. In the meantime, a model that would allow other CMS to inform, and be informed by other bodies in the wider community is to be prepared for consideration.

Martin Smith
CMS Secretariat

GUSTAVE CHOQUET

Gustave Choquet, who was the Hardy Lecturer of the London Mathematical Society in 1969 and elected an Honorary Member of the Society in 1988, died on 14 November 2006, aged 91. He was born in Solesmes in north-eastern France on 1 March 1915, studied at the École Normale Supérieure 1934–38, and succeeded brilliantly in the mathematical Agrégation in 1937. Embarking on research, he received guidance and much encouragement from Denjoy. A Jane Eliza Proctor bursary allowed him to visit Princeton for the year 1938–39. During the war he continued research with the support of the CNRS, and he obtained his Docteur es Sciences degree in 1946. He taught at the French Institute in Poland 1946–47. After a brief spell as Maître de Conférences, he was Professor in the University of Paris (later in Paris VI) 1950–1984; he was also Professor at the Ecole Polytechnique, 1965–70. He was a Member of the Académie des Sciences, and an Officer of the Légion d'Honneur.

He published more than 160 mathematical articles and 11 books. He made important contributions to a variety of fields: topology, measure theory, descriptive set theory, potential theory, and functional analysis. Two themes deserve particular mention. His monumental 1953/4 paper *Theory of capacities* contains among many riches his celebrated *capacitability theorem*. A second great theme is his theory of integral representations in compact convex sets and weakly complete cones, now usually known as *Choquet theory*, which launched a huge development. The work on capacities and that on integral representations have both found many applications in analysis and probability.

His personal distinction was allied in a remarkable way to great kindness and humanity. He was an inspiring teacher who gave generous encouragement and support to pupils and younger colleagues. The Équipe d'Analyse which he founded remains active today. For many years he collaborated with Brelot and Deny in running a seminar on potential theory. He also founded in 1960 the Séminaire de l'Initiation à l'Analyse, which still meets regularly. He was President of the International Commission for the Study and Improvement of Mathematical Teaching, 1950–62.

His leisure pursuits included gardening and mountain walking, and he was devoted to his family. His wife Madame Yvonne Choquet-Bruhat, who survives him, is herself a distinguished mathematician and a Member of the Académie des Sciences.

D.A. Edwards
University of Oxford

APPLIED STOCHASTIC MODELS AND DATA ANALYSIS

The 12th international conference on Applied Stochastic Models and Data Analysis (ASMDA 2007) will take place in Chania, Crete, Greece (29 May – 1 June). The ASMDA Conferences are organized every two years starting 25 years ago with the first ASMDA Symposium organized in Brussels, Belgium (1981). The papers presented are included in special volumes. The best papers appear in special issues of the leading journals of the ASMDA field.

For further information visit the conference website www.asmda.com or contact Professor Christos H. Skiadas (ASMDA 2007, Chair), Director, Data Analysis and Forecasting Laboratory, Technical University of Crete (skiadas@asmda.com).

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POSTGRADUATE GROUP THEORY CONFERENCE 2007

The 9th Annual Postgraduate Group Theory Conference (PGTC) will be held at the Centre for Mathematical Sciences at the University of Cambridge from Wednesday 11 to Friday 13 April. There will be two plenary lectures given by Dr P.M. Neumann (Oxford) and Professor R.A. Wilson (QMUL).

The PGTC is a student organised conference, giving graduate students in group theory and related areas from across the UK a chance to present their research, as well as to find out about the research of others. It also provides an opportunity to meet and get to know other students, by means of a number of social events. Every participant is encouraged to give a short talk about their work, although this is optional. Visit www.pgtc2007.org or email organisers@pgtc2007.org for further information. This conference is supported by an LMS Scheme 1 grant.

THE WALES INSTITUTE OF MATHEMATICAL AND COMPUTATIONAL SCIENCES

Patron: Professor Sir Michael Atiyah OM, PRSE, PPRS

On 18 December the new Wales Institute of Mathematical and Computational Sciences (WICMS) was launched in Swansea during an official banquet. This follows the Welsh Assembly Government and HEFCW having agreed to support the foundation of WIMCS with a grant of £5 million phased over four years starting in December 2006. The Institute, which involves departments in the University of Wales Swansea, Cardiff University, the University of Wales Aberystwyth and the University of Wales Bangor, is set to boost the research base in mathematical and computational sciences, and to increase income for research in these areas in Wales. WIMCS will also play an important role in fostering collaboration with industry and commerce and enhancing the interaction between universities and schools.

The work of WIMCS will be organised in clusters linking different subject areas and/or Universities. Initially the following clusters (coordinator) will be introduced
- Analysis (of PDEs)
- Stochastic Processes and Stochastic Analysis
- Mathematical Physics
- Computational Modelling
- Statistics and Operational Research

The funding is for appointing seven Research Professors and 20 fixed term Research Fellows. The research professors will be permanent posts located in one of the Departments with the appointees working at least for the first four years as research professors in WIMCS. The following chairs will soon be advertised:

Aberystwyth:
Chair in Mathematical Modelling (Computational Modelling Cluster)
Cardiff:
Chair in Analysis
Chair in Mathematical Physics
Chair in Statistics and Operational Research
Swansea:
Chair in Analysis of PDEs
Chair in Stochastic Processes and Stochastic Analysis
Chair in Computational Modelling

Each chair will be endowed with a fixed term research fellow. For more information see: http://WIMCS.swan.ac.uk.

FROM HIGMAN-SIMS TO URYSOHN

A conference in honour of the sixtieth birthday of Peter Cameron *From Higman-Sims to Urysohn: a random walk through groups, graphs, designs, and space* will be held at St Martin's College, Ambleside from Thursday August 23 (afternoon) to Sunday August 26 (morning). The organisers are Robert Bailey (QMUL), Dugald Macpherson (Leeds), Sarah Rees (University of Newcastle) and Leonard Soicher (QMUL). The following have provisionally agreed to speak:
- R. Bailey (Queen Mary, University of London, UK)
- P.J. Cameron (Queen Mary, University of London, UK)
- P. Diaconis (Stanford University, USA)
- D.M. Evans (University of East Anglia, UK)
- D. Fon-der-Flaass (Novosibirsk, Russia)
- J. Hall (Michigan State University, East Lansing, USA)
- C.Y. Ku (Caltech, USA)
- E. Lander (MIT and Harvard, USA)
- P.M. Neumann (Oxford, UK)
- C.E. Praeger (University of Western Australia, Perth)
- C. Roney-Dougal (St. Andrews University, UK)
- J. Saxl (Cambridge, UK)
- A. Sokal (New York University, USA)
- S. Thomas (Rutgers University, USA)

The meeting is supported by: the London Mathematical Society; the British Combinatorial Committee; the School of Mathematical Sciences, Queen Mary, University of London; funds from a Marie Curie Chair (MEXC-CT- 2005-024052). For further information visit the website: http://www.maths.qmul.ac.uk/~rfb/pjc60.

ANNUAL LMS SUBSCRIPTION 2006-07

The Society is appreciative of those members who have paid their 2006-07 subscriptions. May we remind those who have not yet paid that subscriptions were due on 1 November 2006. Prompt payment ensures continuity of publications and avoids the need for time-consuming reminders. The Society reserves the right to discontinue the supply of periodicals and the *Newsletter* to members whose subscription remains unpaid by **31 January 2007**.

The methods of payment are either by a sterling cheque drawn on a UK bank, a US$ cheque drawn on a US bank, direct debit or credit card. It is our preference that members who have a UK bank account should pay by direct debit. Request a direct debit mandate to take advantage of this convenient form of payment. If you have misplaced your subscription form either download the form from the membership section of the LMS website (www.lms.ac.uk) or contact the LMS office (email: membership@lms.ac.uk; tel: 020 7637 3686; fax: 020 7323 3655).

Individual members 2006-07 rates:

Subscriptions	£	US$
Ordinary	39.50	79.00
Reciprocity	19.75	39.50
Associate	10.00	20.00
European Mathematical Society (additional)	17.00	34.00

Publications		
Bulletin Volume 39	40.00	80.00
Journal Volumes 75 & 76	80.00	160.00
Proceedings Volumes 94 & 95	80.00	160.00
JCM (electronic) Volume 10	free	free
Nonlinearity Volume 20 – except North America	60.00	
– North America		155.00
Journal of the European Mathematical Society Volume 9	36.00	72.00

VISITS

PROFESSOR YONG ZHOU

Professor Yong Zhou (East China Normal University, Shanghai) will spend three weeks in the UK from 19 January – 9 February on an LMS Scheme 2 grant, visiting:

- Oxford, 19-28 January, contact John Ball (ball@maths.ox.ac.uk)
- Durham, 29 January – 4 February, contact Brian Straughan (brian.straughan@ durham.ac.uk)
- Bath, 4-9 February, contact Valery Smyshlyaev (vps@maths.bath.ac.uk)

Professor Zhou's research interests are in nonlinear PDE and fluid dynamics, and while in Oxford he will speak at a 1-day meeting on mathematical fluid mechanics to be held on 22 January.

MR TOSIN MEWOMO

Mr Tosin Mewomo (University of Agriculture Abeokuta, Nigeria) a PhD student in Banach algebras, will be visiting the UK during February and March. Three weeks at Queen's University Belfast (29 January – 19 February), one week at the University of Glasgow (19–24 February) followed by three weeks at the University of Leeds (24 February – 14 March). During his visit he will lecture at:

- Belfast on 16 February at 2pm
- Glasgow on 21 February at 2pm
- Leeds on 6 March at 2pm

For further information, contact Ariel Blanco (a.blanco@qub.ac.uk). This visit is supported by an LMS Scheme 5 grant.

DR THERESIA EISENKOELBL

Dr Theresia Eisenkoelbl (University of Vienna), a specialist on Schur functions, will be visiting the UK during February. During her visit based at Queen Mary, University of London she will also lecture at the universities of York and Cambridge. For further information contact Professor T.W. Müller (T.W.Muller@ qmul.ac.uk). This visit is supported by an LMS Scheme 2 grant.
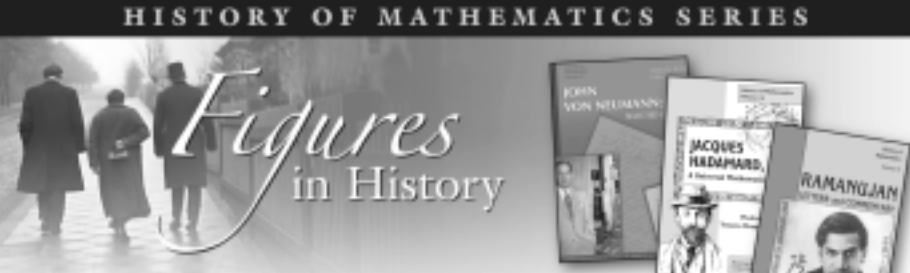
PROFESSOR JANE HAWKINS

Professor Jane Hawkins (University of North Carolina at Chapel Hill) will be visiting the UK during January and February. Her research area includes abstract ergodic theory, Bernoulli partitions, complex dynamics and cellular automata. Lectures will take place on:

- Tuesday 23 January at 2 pm, Room B3.02, Department of Mathematics, University of Warwick
- Monday 29 January at 2.30 pm, Room S2.14, School of Mathematics, University of East Anglia
- Friday 2 February at 4 pm, Room 22AA04, Department of Mathematics, University of Surrey

The latter will be part of an Ergodic Theory Workshop featuring three speakers. For further information, contact Dr H. Bruin (H.Bruin@surrey.ac.uk). This visit is supported by an LMS Scheme 2 grant.

KCL OPEN DAY

King's College London is holding a Postgraduate Open Day on Friday 16 February 2007. Research degrees are offered in *Analysis and Partial Differential Operators*, *Number Theory*, *Geometric Lie Theory*, *Disordered Systems and Neural Networks* and *Financial Mathematics and Applied Probability*. Taught MSc programmes exist in Pure Mathematics and Mathematical Physics. More specialised MSc degrees are offered in Financial Mathematics, Information Processing and Neural Networks and Theoretical Physics.

Further information contact: Miss Rebecca Cullen, Postgraduate Administrator, Mathematics Department, King's College London, Strand, London WC2R 2LS (tel: 020 7848 2107, email: pg.maths@kcl.ac.uk, website www.mth.kcl.ac.uk/postgraduate/openday2007).

HAMILTONIAN DYNAMICAL SYSTEMS AND APPLICATIONS

A *séminaire de mathématiques supérieures* (NATO Advanced Study Institute) will be held at the Université de Montréal from 18-29 June 2007. The speakers are:

KAM theory
Eliasson Hakan (Université de Paris VII, France)
Xiaoping Yuan (Fudan University, People's Republic of China)
Laurent Stolovich (Université de Toulouse, France)

Hamiltonian PDE and small divisors
Jürgen Poeschel (Stuttgart, Germany)
Jean Bourgain (AIS, Princeton, USA)

Hamiltonian PDE and Nekhoroshev theory
Dario Bambusi (Università di Milano, Italy)

Variational methods in Hamiltonian dynamics
Paul Rabinowitz (University of Wisconsin Madison, USA)
Massimiliano Berti (SISSA/ISAS, Italy)

Arnold diffusion
C.Q. Cheng (Nanjing University, People's Republic of China)
Rafael de la Llave (University of Texas – Austin, USA)

Hamiltonian dynamical systems
Dimitry Treschev (Moscow State University, Russia)

Applications to celestial mechanics
Alain Chenciner (Observatoire de Paris/CNRS, France)

Applications to control theory
Andrei Agrachev (SISSA/ISAS, Italy)

Applications to PDE
C. Eugene Wayne (Boston University, USA)

Applications to averaging methods and adiabatic invariants
Anatoly Neistadt (Space Research Institute, Russia)

This summer school is aimed primarily at postdoctoral fellows, doctoral students and junior faculty. Financial support is available. Application deadline is **28 February**. For further information visit www.dms.umontreal.ca/sms.

PROOF

Proof by David Auburn will be performed at the Putney Arts Theatre, London SW15 from Tuesday 16 to Saturday 20 January. Telephone 020 8788 6943 or email: mail@putneyartstreatre.org.uk for tickets. For further information visit the website www.putneyartstheatre.org.uk.

University of Birmingham

School of Mathematics

The School of Mathematics is recognised for its international excellence in research in Pure and Applied Mathematics. As part of the ongoing programme to broaden its research base in these areas, the School seeks to continue its expansion in Computational Mathematics, Algebra and Mathematical analysis. Applications are invited for three Lecturer/Senior Lecturer posts.

Lecturer/Senior Lecturer – Computational Maths   Post Ref: S43088
Candidates with an international reputation in computational mathematics, preferably with close links to current research interests of the applied mathematics group which include numerical analysis, numerical linear algebra, computational fluid dynamics and computational modelling. This post is available from April 2007.

Informal enquiries are strongly encouraged to Professor D.J. Needham – Head of Applied and Applicable Mathematics (tel: 0121 414 6593 or email: needhamd@maths.bham.ac.uk).

Lecturer/Senior Lecturer – Algebra   Post Ref: S36666
The successful candidate will have research strength in Mathematics or adjacent discipline with substantial experience of research in Algebra and teaching both undergraduate and postgraduate students. The appointment will take effect from April 2007 or by a date to be agreed.

Lecturer/Senior Lecturer – Mathematical Analysis   Post Ref: S177
The successful candidate will have research strength in Mathematics or adjacent discipline with substantial experience of teaching and research in Analysis, preferably in Partial Differential Equations, Spectral Theory and/or Harmonic Analysis. This post is available from April 2007.

Informal enquiries for both positions in Algebra and Mathematical Analysis to Professor A. Sobolev (tel: 0121 414 3415, email: a.sobolev@bham.ac.uk) or Professor C. Parker (tel. 0121-414 6199, email: c.w.parker@bham.ac.uk).

Starting salaries for all positions at Lecturer Grade in the range of £32,471 to £38,772 a year (potential progression on performance once in post to £43,638). A Senior Lecturer Grade appointment starting salary in the range of £39,935 to £46,295 a year (potential progression on performance once in post to £49,116). The successful candidate will be appointed at an appropriate grade depending on experience and qualifications.

Information about the School and its research groups is available on www.mat.bham.ac.uk/research.

Closing date: **15 January 2007**. Please quote the relevant post reference

Details from 0121 415 9000 or www.hr.bham.ac.uk/jobs
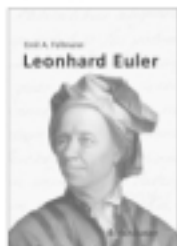**HR, University of Birmingham, Edgbaston, Birmingham B15 2TT**

LONDON MATHEMATICAL SOCIETY

INVITED LECTURES 2007

The Geometric Langlands Correspondence
David Ben-Zvi, University of Texas at Austin

Mathematical Institute, Oxford, 10-14 April 2007

This lecture series will explore the geometric Langlands
program, a subject of much exciting recent activity at the
interface of representation theory, algebraic geometry and
quantum field theory. The lectures will assume a familiarity
with first courses on Lie groups and algebraic varieties.
Research students are particularly encouraged to attend.

Lectures will begin at 2.30pm on Tuesday 10 April and will
finish by lunchtime on Saturday 14 April. The main set of 10
lectures by David Ben-Zvi will be assisted by more specialized
talks by Ian Grojnowski, Dmitriy Rumynin, Constantin
Teleman and others.

All mathematicians are welcome to attend the lectures.
There will be a registration fee of £30, payable on arrival.
The registration fee will be waived for research students.
Limited funds are available to support participants. Priority will
be given to research students and mathematicians who would
benefit from attending the lectures, but who would otherwise
be prevented from attending by financial constraints. Please
apply by **15 February 2007** using the online application for
(www.maths.ox.ac.uk/~szendroi/newlanglands.html).

RECORDS OF PROCEEDINGS AT MEETINGS

ANNUAL GENERAL MEETING

held on *Friday 17 November 2006* at University College London. About 110 members and visitors were present for all or part of the meeting.

The meeting began at 3:15 pm, with the President, Professor J.F. TOLAND, FRS, FRSE, in the Chair. Members who had not yet voted were invited to hand their ballot papers to Professor A.R. Camina and Professor P.T. Saunders, the Scrutineers.

The Treasurer, Professor N.M.J. Woodhouse, presented his annual report, which is published in the Newsletter. Messrs Kingston Smith were re appointed as auditors for 2006/07.

Ten people were elected to Ordinary Membership: G. Akemann, S. Aldhafeeri, T.M.N. Goncalves, E.L. Hunsicker, N.P. Mazza, A. Pal, G.R. Sarson, S. Shpectorov, J. Skokan, C. Yuan; seven people were elected to Associate Membership: A.J. Cain, E. Ford, J.A. Giudice, J. Ing, J.D. Inglis, C.J. Munro, O.O. Obanubi; one person was elected to Reciprocity Membership: I. Mette. Two members signed the book and were admitted to the Society.

The President, on Council's behalf, presented certificates to the 2006 Society Prizewinners: Pólya Prize: Sir Peter Swinnerton Dyer; Senior Berwick Prize: Professor M. Reid; Fröhlich Prize: Professor M. Weiss; three of the Whitehead Prizes: Professor J. Sherratt, Dr A. Smoktunowicz and Professor P. Sutcliffe.

The President expressed the gratitude of members from all over the world to Susan Oakes, who had completed 25 years working for the Society.

Dr P. Topping gave a lecture entitled *Ricci flow, entropy and optimal transportation*.

After tea, Professor Saunders announced the results of the ballot. The following Officers and Members of the Council were elected: President: J.F. Toland; Vice Presidents: D.G. Larman, F.A. Rogers; Treasurer: N.M.J. Woodhouse; General Secretary: C.M. Goldie; Programme Secretary: S.A. Huggett; Publications Secretary: K.J. Falconer; Education Secretary: C.J. Budd; Members at Large of Council for two years: A. Borovik, D.E. Buck, H.G. Dales, R.M. Thomas, A.J. Wilkie, E. Winstanley; Member at Large of Council for one year: S.N. Chandler Wilde. Council membership is completed by the following who were elected for two year terms in 2005: R.T. Curtis, P.J. Davies, A.M. Etheridge, I.G. Gordon, J.F.C. Kingman. The following members were elected to the Nominating Committee: M.R. Bridson, A.G. Chetwynd, C.M. Series, G.M. Stallard.

Professor R. Hamilton gave a lecture entitled *The Ricci flow*.

Professor Toland expressed the thanks of the Society to Professor S.K. Donaldson, FRS, the Scientific Organiser of today's meeting, for the two excellent speakers and a fascinating afternoon.

After the meeting, a reception was held at De Morgan House, followed by the Annual Dinner, which was held at the Bonnington Hotel and attended by 80 people.

LMS ANNUAL GENERAL MEETING
Friday 17 November 2006

A large crowd gathered for this year's AGM and justifiably so for, after the society business, the audience were treated to two talks on a recent hot topic in mathematics, namely the Ricci flow. This is a subject which has reached even a lay audience in the past year as it played the central role in Grisha Perelman's recent resolution of the Poincaré conjecture. Perelman proved the Poincaré conjecture by completing a program begun by Richard Hamilton over twenty years ago. Hamilton was the inventor of the Ricci flow and we were lucky enough to have him here as a speaker. His was the second talk but, since it was of an expository nature, it perhaps makes sense to relay it first.

Speaking with his customary elan, Hamilton began by describing the Ricci flow as a 'heat equation' for a Riemannian metric. The idea is that evolving a metric in the direction of minus its Ricci tensor should smooth out the curvature, similar to the effect of diffusion on uneven distributions of heat. This principle is borne out by the fact that many geometric quantities (e.g., curvature, geodesic lengths etc.) evolve by diffusion or diffusion reaction equations under Ricci flow. One might hope, then, that on running Ricci flow, an arbitrary initial metric might converge to a metric of constant curvature. Hamilton went on to explain that for compact surfaces, where constant curvature metrics are always known to exist, that this is precisely what happens, provided one rescales the metric with time. This rescaling is necessary because, for example, positively curved metrics shrink, hence become more positively curved and so shrink even faster. On the other hand, negatively curved metrics grow, albeit at a slower and slower rate.

In three dimensions the picture is much more complicated and singularities form in the metric. One example is that of a 'neck pinch'. This singularity forms in a manifold which has a large cylindrical region, whose cross section is a round sphere, but which is slightly negatively curved along its length. The differing signs in the curvature compete for dominance but, in some cases, the positive curvature wins and the round sphere shrinks to a point in finite time causing a singularity as the manifold 'pinches' along its 'neck'.

Hamilton then gave a beautiful description of his method for understanding singularity formation. He said he thinks of Ricci flow as 'running a movie' of the evolution of a man-

M. Reid, M. Weiss, J. Toland, P. Swinnerton Dyer, J. Sherratt, P.Sutcliffe, A. Smoktunowicz

ifold; as a singularity forms you both zoom the movie in to the point where the singularity is forming and simultaneously slow it down. Repeatedly doing this gives, in the limit, another 'movie' which is another Ricci flow and which models the singularity formation. For example, in the neck pinch singularity described above, the singularity model is a regular (product) cylinder collapsing to a line under the Ricci flow. These singularity models have a special property: they are ancient solutions to the Ricci flow; because of the time rescaling the limiting solution has existed for all past times. Such solutions are necessarily very special because, as Ricci flow spreads out curvature and this been going on indefinitely, the resulting metric must be very evenly curved.

Next Hamilton explained why understanding precisely which singularites can form is the key to proving the Poincaré conjecture. The idea is to take a simply connected three-manifold with an arbitrary metric and run Ricci flow, hoping it will converge to a round sphere. After a time you will encounter a singularity which you hope to recognise as some sort of neck pinch; for example, a singularity whose model is a collapsing cylinder. If that is the case, then you can cut the manifold across the neck, glue two caps onto the holes and try to carry on the flow. Hopefully, after a finite time and a finite number of surgeries, you will be left with a collection of round spheres. This means you can recognise your original manifold as made up of the connected sum of several spheres and so homeomorphic itself to a sphere.

The main obstacle to this plan was that, pre Perelman, one of the potential singularity models did not have a cylindrical region for one to cut across. This model is known as the 'cigar', for it resembles the product of a cigar shape and a line. One of Perelman's major advances in the study of the Ricci flow was to give an in-depth description of what happens at regions of very high curvature, where the singularities are forming. Using this analysis he is able to rule out this bad sort of singularity; as Hamilton put it, 'Perelman showed that it was close, but no cigar!'

The second speaker, Peter Topping, also spoke about Ricci flow; but, by contrast, described some 'post Perelman' research. His theme was the relationship between Ricci curvature, or Ricci flow, and optimal transport. In optimal transport, one takes two measures on a Riemannian manifold and tries to deform one into the other with the least 'transportation cost' possible. Topping described this with the following pretty analogy: represent the two measures by two configurations of a kilo of sand spread over your manifold; you want to move the grains of sand from the first configuration into the second whilst on average moving as little sand as possible. Roughly speaking, the smallest amount of energy required to do this defines a distance, called the Wasserstein distance, between the measures.

The next theme in Topping's talk was the interplay between optimal transport and diffusion. Rather than looking at the Wasserstein distance between two fixed measures, one allows the two measures to evolve according to the heat equation. The central theorem here is due to Sturm and Von Renesse and it says that, provided the manifold has non-negative Ricci curvature, the two evolving measures become closer and closer. Topping described an intuitive reason for this, which is that the heat equation is the gradient flow for the Boltzman Shannon entropy with respect to the Wasserstein metric. From this point of view, Sturm and Von Renesse's result is, heuristically at least, a consequence of another theorem which says that, for manifolds with non negative Ricci curvature, entropy is convex along Wasserstein geodesics in the space of measures. This convexity result has a kind of converse, also due to Sturm and Von Renesse, which says that entropy being convex charac-

terises non-negative Ricci curvature. This means that the concept of non-negative Ricci curvature can now be extended to much more general spaces than Riemannian manifolds; simply replace it with the condition that entropy be convex along Wasserstein geodesics.

At this point, Topping began describing his own research in the area. He considered measures on a manifold on which the metric was also evolving under Ricci flow. The motivation comes from the work of Perelman which highlighted the strong interplay between the geometry of a manifold under Ricci flow and solutions to the heat equation in backwards time. Consequently, Topping considered the Wasserstein distance between two measures evolving under the backwards heat equation on a manifold undergoing Ricci flow. He proved, jointly with McCann, that in this situation, and with no restriction on curvature, that the measures become closer and closer as you look further back in time.

Perhaps the most exciting aspect of this picture is that this contraction of two diffusions under the backwards heat equation characterises 'super' Ricci flows, i.e., metrics evolving by at least minus twice their Ricci curvature. This characterisation suggests a possible way to extend the notion of Ricci flow to spaces more general than manifolds, in much the same way as non negative Ricci curvature has been extended. Topping explained, in answering a question of Hamilton, that much remained to be done to see if this idea could be fruitfully applied. One might hope, however, that this would lead to 'weak solutions' to the Ricci flow, which would be a conceptual breakthrough of great significance.

Afterwards, many people walked through the pouring rain to De Morgan House for a reception, and from there to the Annual Dinner.

Joel Fine
Imperial College London

TWENTY FIVE YEARS
Susan Oakes

An extract from David Brannan's speech at the LMS Annual Dinner held after the Society's AGM on Friday 17 November 2006:

The mathematical world, and members of LMS in particular, owe an enormous debt of gratitude to Susan Oakes, who has served as LMS Administrator for over a quarter of a century. It is an enormous pleasure today to say thank you to her for this tremendous achievement.

Susan was born in Paris where her father was a diplomat. However, they had to leave there soon afterwards because her mother is Hungarian and during the Cold War everyone from Hungary was suspected of being a spy. So the family moved to London and then to the Solomon Islands where Susan ran wild climbing banana trees, and so on!

After working in Hong Kong and Australia, she came back to London in the late '70s. She worked initially at Senate House, then as the Mathematics Departmental Secretary at Queen Elizabeth College (now merged with Kings College) and finally started with LMS on 1 January 1981.

Susan shared a spartan rented office with an RAS secretary in the Royal Astronomical Society premises in Burlington House on Piccadilly. This was at the very top of two long flights of stairs; there was no lift, and so LMS Officers would very often arrive to greet Susan puffing and panting after climbing up many stairs past awe-inspiring paintings of distinguished astronomers. In the January 1991 LMS *Newsletter*, Susan claimed that in the last decade she had climbed the height of Mount Everest to reach her office! In the late '80s LMS acquired instead sole use of a tiny room next door to the earlier one. Then RAS agreed to rent us a much larger room across the corridor; we moved in and refurnished the room very nicely indeed.

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What did Susan do for LMS? Well, for most of her 25 years, virtually everything. She worked closely with a line of LMS Treasurers – particularly Rolph Schwarzenberger, a very kind and unselfish person, Treasurer in Susan's first five years; she managed our daily financial affairs, and worked closely with our accountant on our annual accounts and forward budgeting. She has also worked with a whole series of Council Secretaries, Meetings and Membership Secretaries, Publications Secretaries, LMS publications editors, and many, many others. And of course to LMS members worldwide, Susan *was* the LMS.

She has run LMS Society meetings all over UK. One of her major successes was the joint LMS-AMS meeting in Robinson College, Cambridge, in 1992. The army of AMS organizers of their part of the meeting could not believe that Susan organized our half of the meeting single-handedly!

She has visited Moscow with LMS, and hosted our Russian Academy of Sciences part-

ners here many times. They have a particularly high regard for Susan, because she throws herself heart and soul into making a real success of Society enterprises. We in the Society truly owe Susan a huge debt of gratitude.

Susan's response:

Thank you for those kind words and for my gift. I would like begin by saying that it has been an honour and a pleasure and even fun to serve the Society for the last 25 years. Obviously a lot has happened and changed since 1981 and I believe it has always been for the best for the Society. When I reflect on the past it is usually through the Presidents, each of whom leave their mark. I better be careful what I say as five of them are here tonight, John Kingman, John Ball, Martin Taylor, Trevor Stuart and of course John Toland. The others in case you were wondering were Barry Johnson, Paul Cohn, Ioan James, Christopher Zeeman, John Coates, John Ringrose, Nigel Hitchin, Peter Goddard and Frances Kirwan.

John Ball   Peter Topping

Richard Hamilton   Norman Biggs

John Toland   Susan Oakes

I am only going to single out one and that is John Ball. Before I joined the LMS I had never stayed very long in a job as is the wont of many young people. As the years went by I set myself goals after which I would leave the LMS. For example one was to be when membership reached 2,000, it is now 2,500 and I am still here. The LMS office was on the top floor of Burlington House and so another goal was to leave once I could no longer climb the stairs. John Ball put paid to that one because in 1998 he bought me De Morgan House in which he gave me a ground floor office! Thank you, John.

So what about my four guests tonight? Presidents as you know come and go but Officers stay a little longer. It was very hard to choose just four people as my personal guests. My first choice would have been the late Rolph Schwarzenberger, my first Treasurer. The few of you here who knew him will know that one of his outstanding attributes was to develop and encourage people to achieve, and this he did with me every step of my way as a new member of staff of the Society.

And so to the four I did choose. David Brannan, who has been a Council & General Secretary and Publications Secretary, I would like to thank for recruiting me. From Rodney Sharp during his era as Council & General Secretary, I thank for teaching me to pay meticulous attention to detail. Alan Pears, as Meetings & Membership Secretary, with whom together we ran the first AMS/LMS meeting, and recently co-authored the Book of Presidents. And in between all the hard work he dragged me to restaurants to check out Society meeting dinner venues. Ben Garling, who was the first LMS Executive Secretary but prior to that had also been a Meetings & Membership Secretary, together we ran the first Irish/LMS meeting in Dublin and I am sure he won't mind me saying, taught me how to appreciate a good glass of wine or two. Thank you all.

REVIEWS

Letters to a Young Mathematician by Ian Stewart, Massachusetts: Basic Books, pp 210, hardback 2006, £13.99, ISBN 0 465 08231 9; paperback 2007, £8.99, ISBN 0465082327.

This book arrived at a particularly opportune moment. On the one hand I am preparing a meeting to encourage A level Mathematics students to study mathematics at University and on the other I am debating what to do after finishing my own degree. On both these topics I have found Stewart to be extremely helpful.

Stewart's cleverly written book consists of a series of letters to 'Meg', the daughter of a family friend. At the beginning of the book we find her still in high school, contemplating studying mathematics, and by the end she has secured a tenured position in a University. We are taken on the journey of her career through the shocks and delights of undergraduate level mathematics, the dilemma of whether to remain at university to go into research and the process of choosing a preferred area of study and supervisor.

By answering Meg's questions in his letters, Stewart covers an enormous range of mathematical issues all of which are immensely relevant, both to the able A level Mathematics student and the undergraduate wondering where it is all leading. He manages to get across the importance of studying Mathematics, the necessity of it and where it is encountered in everyday life. Indeed, the first six pages detail many examples of where Mathematics is used to produce things that most young people take for granted. He makes the age-old point that we know a doctor has a medical degree and a lawyer a law degree but what do you do with a Mathematics degree?

Stewart excites the would-be mathematician by mentioning many mathematical topics and problems, past and present. There's enough Mathematics here to whet anyone's

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appetite without putting them off, for example: Fermat's Last Theorem, Lie Algebras, the Goldbach conjecture and the Riemann Hypothesis. Modelling, concerning issues such as populations, traders in the stock market and the Millennium Bridge fiasco, also features, as do some unsolvable problems like trisecting the angle, which it appears Meg has tried! Stewart also uses the book to explain the necessity of proofs (at some length) and the need for studying both pure and applied Mathematics for as long as possible. There are invaluable chapters covering topics such as how to think mathematically and the best ways to learn and teach the subject. There are jokes and puzzles and anecdotes concerning his own experiences that provide wonderful insights into the life of a mathematician.

Stewart ends with a chapter entitled 'Is God a Mathematician?' For the most part this is a beautiful, philosophical look at symmetry and the wonders of the universe. However, Stewart's last line referring to God as 'She' seems out of place and irrelevant and personally I found this rather disappointing.

That aside, once one gets over the initial language problems encountered when reading a book intended for the American market, I would not hesitate to recommend it. It is the kind of book that one can read once for sheer enjoyment and then go back to again and again, picking out the bits pertinent to one's own situation.

If there was a way of ensuring every A level Mathematics student in the country read *Letters to a Young Mathematician*, I think our shortage of mathematics graduates might easily be solved.

Noel Ann Bradshaw
Greenwich College

Great Feuds in Mathematics: Ten of the liveliest disputes ever by Hal Hellman, Hoboken, NJ: Wiley, 2006, Hardback, vi+250pp, £16.99, ISBN: 0 471 64877 9

Do not be put off by the cover (a black and white photograph of a hand and a blackboard, and lettering in lurid clashing colours). Do not be put off by the title either, which to me at least suggested a kind of *1066 and All That* take on the history of mathematics.

The book itself is rather good. It tells ten stories about conflicts in mathematical history: good stories, on the whole, and told in a racy and journalistic manner that is certainly readable and engaging (though, perhaps, wearing in places). Various familiar incidents are covered – Cardano/Tartaglia, Newton/Leibniz – plus a few very welcome, less predictable choices – Sylvester's speech against Huxley, for example, was new to me.

The book deals with incidents from the sixteenth century to the twentieth. Hellman seems strongest on mathematics around 1900, and on the philosophy of mathematics and its discontents. His final discussion of mathematical realism and constructivism and his general remarks about the way mathematics develops over time strike me as genuinely insightful, although possibly a specialist in these topics would disagree.

The earlier chapters are, for me, a little less convincing, dwelling rather more on the externals of mathematical history – Tartaglia's scar, Cardano's syphilitic daughter. There is not much mathematics in the book, but Hellman does not shy away from an equation or two when needed.

All the mathematical protagonists are men: it surprises me that Hellman could find no woman, say in the early twentieth century, whose struggle for mathematical recognition could be described as a feud.

Hellman does a good job of displaying personal or conceptual connections between the chapters; and he makes some often quite sophisticated asides about how these disputes related to the development of mathematical culture more generally. By contrast, his dextrous storytelling hardly needs the attention holding device of his rather frequent comparisons between past and present.

A few factual errors are inevitable and excusable. Greek mathematicians did *not* solve equations; del Ferro did *not* develop an 'algebraic formula'; Descartes' childhood was not, strictly, the age of Montaigne. Such nitpicking is scarcely relevant in a book of this kind. The general lines of each story seem accurate, as does Hellmann's rapid and fluent sketching of different historical periods. He relies on a few cliches and half truths, but, again, in a very introductory work such things are acceptable.

Hellman's re-thinking of old debates is often genuinely exciting. But he quotes historians in the present tense as though reporting interviews: since his sources are a mix of classic accounts with a scattering of very recent work this, and his keenness to show multiple points of view, animates a few dead horses and sometimes plays mild havoc with historiography. An unwary reader might imagine that certain historians separated by many years and much new evidence are in debate with one another, when, often, the older is simply superseded. One example: the notion that Newton used the calculus when writing the *Principia* is not so much an alternative point of view as a discredited one. Equally, Hellman's keenness on novelty of interpretation rather than rehashing stale judgements sometimes produces results which did not convince me: for example, I would have liked more evidence both about Fermat's character and about Huxley's attitude to mathematics after Sylvester's attack.

All of this makes me wonder whether the needs of the 'Great Feuds' series (this is book four) work against Hellman's strengths as a very intelligent popular writer. The book is substantially better than its dust jacket blurb, so to speak. A few more details, a few chapters not about conflict, and it would be an attractive popular introduction to the history of mathematics: neither overloaded with technical details nor excessively simplistic.

Hellman wishes show that the historical development of mathematics is not coldly logical, but he risks fostering the opposite misapprehension: that it consists entirely of violent and tragic personal conflict. Academic historians, too, struggle with the relationship between violent and incremental change, but to excise one or the other seems a shame, particularly in what may be readers' first taste of the subject.

There are many popular histories of mathematics, and one should not carp about the appearance of a new one, particularly one which has so much to recommend it. My slight discomfort with this book amounts to the feeling that it is better than its 'great feuds' packaging, and that, unconstrained by that packaging, it could easily have been better still.

Benjamin Wardhaugh
Hertford College, Oxford
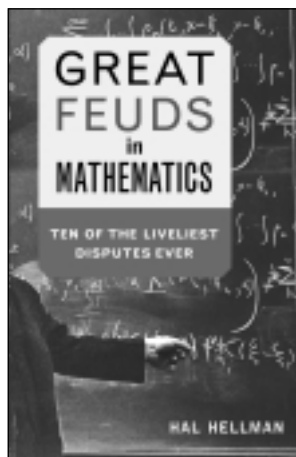
London Mathematical Society/Gresham College

Joint Annual Lecture

Tuesday 22 May 2007

6 pm at Barnard's Inn Hall, Holborn

Multiplying and dividing whole numbers:

Why it is more difficult than you might think

Professor Timothy Gowers FRS

Rouse Ball Professor of Mathematics, Trinity College Cambridge

Admission free
No reservations required
Places allocated on a 'first come, first served' basis

Enquiries to Gresham College, Barnard's Inn Hall, Holborn, London EC1N 2HH
Telephone 020 7831 0575 enquiries@gresham.ac.uk

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CECIL KING TRAVEL SCHOLARSHIP

The London Mathematical Society annually awards a £5000 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.

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 interview.

Applicants should normally be nationals of the UK or Republic of Ireland, either registered for or having recently completed a doctoral degree at a UK University.

Applications should be made using the form available on the Society's website (www.lms.ac.uk) or from Isabelle Robinson at the Society (robinson@lms.ac.uk). The closing date for applications is **Friday 23 February 2007**. It is expected that interviews will take place in London in April.

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 Education Committee.

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CRYPTOGRAPHY, QUANTUM INFORMATION, MATHEMATICAL APPLICATIONS

Wednesday 17 January 2007: Evening Lectures

Lectures will be held in the Hardy Room, De Morgan House, 57 Russell Square, London WC1B 4HS

5:00pm – 5:30pm: *Cryptography: theory versus practice*
Professor Fred Piper (Information Security Group, Royal Holloway College)
In theory there is no difference between theory and practice. However in practice there is. This is particularly true in Cryptography where poor implementation can often negate the advantage of using a well designed mathematical algorithm. In this short introduction to the two main lectures we illustrate some of these implementation issues, using historical examples with RSA as the main focus.

5:30pm – 6:00pm: *Provably secure cryptography*
Professor K Paterson (Information Security Group, Royal Holloway College)
In recent years, there has been a trend in Cryptography away from ad hoc security analysis towards a more formal approach, involving mathematical proofs of various kinds. This has led to the development of what is called 'provable security' by the cryptographic research community. In this short talk, we will give an overview of the main developments in this direction. We will touch on how security proofs differ from traditional mathematical proofs, what such proofs can tell us about security in the real world, and what the future might hold in this area.

6:00pm – 6:30pm: *Break for Refreshments*

6:30pm – 7:10pm: *Quantum information: analogies anddifferences to secret information*
Professor Andreas Winter (School of Mathematics, Bristol)
I will attempt to give a gentle – and highly selective – introduction to quantum information by following a historical strand dating back to at least the early 90s, if not to the first quantum key distribution protocol BB84. That is, the conceptual exploitation of the similarity between quantum information and secret information. On the one hand, the link has been used to urge the secrecy of key obtained in BB84 from the 'monogamy of quantum entanglement'. In the other direction, as more of an analogy it helped converting classical error correction and privacy amplification methods into quantum error correction codes. Recently, Devetak has succeeded in making this direction of the link precise and prove the long-conjectured quantum channel coding theorem. However, even more recently it was understood that in a quantum world, quantum information is ultimately not reducible to secret information.

Frank Smith and the LIMS committee
Entrance is Free and Event is Open to All. RSVP office@lims.ucl.ac.uk

CALENDAR OF EVENTS

This calendar lists Society meetings and other events publicised in the *Newsletter*. Further information can be obtained from the appropriate LMS *Newsletter* whose number is given in brackets. A fuller list of meetings and events is given on the Society's website (www.lms.ac.uk/meetings/calendar.html).

JANUARY 2007
5-6 The Hall Higman Theorems Conference, Oxford (352)
7-10 Number Theory, UK Japan Winter School, Cambridge (354)
8-31 Mar Interface Problems and Applications in Fluid Dynamics,Singapore (351)
10-15 Analysis on Graphs & its Applications LMS/EPSRC Short Course, Gregynog Hall, University of Wales (353)
12 Yorkshire & Durham Geometry Day, Durham (353
17 Cryptography, Quantum Information, Mathematical Applications Evening Lectures, De Morgan House, London (355)
19 Edinburgh Mathematical Society Meeting, Edinburgh (350)
24 Winter Combinatorics Open University Meeting, Open University (354)

FEBRUARY 2007
9 LMS Meeting, Mary Cartwright Lecture, London (355)
16 Edinburgh Mathematical Society Meeting, Edinburgh (350)
16 Open Day, King's College London (354)

MARCH 2007
4-7 21st Century Mathematics Conference, Lahore (353)
16 Edinburgh Mathematical Society Meeting, Dundee (350)
26-30 Theory of Highly Oscillatory Problems Workshop, INI, Cambridge (353)
26-31 Geometric Flows and Related Topics Symposium Workshop, Warwick (350)

APRIL 2007
10-14 LMS Invited Lectures, The Geometric Langlands Correspondence, Oxford (355)
11-13 Postgraduate Group Theory Conference, Cambridge (355)
16-19 BMC, Swansea (354)
17-19 BAMC, Bristol (354)
20 LMS Midlands Regional Meeting, Loughborough
27 Edinburgh Mathematical Society Meeting, Stirling (350)
27 Women in Mathematics Day, De Morgan House, London (355)

MAY 2007
14-13 Jul Braids Programme, Singapore (353)
18-20 Midwest Geometry Conference, Iowa, USA (350)
22 Multiplying and Dividing Whole Numbers, Gresham College London (355)
25 Edinburgh Mathematical Society Meeting, Aberdeen (350)
30 LMS South West & South Wales Regional Meeting, Cardiff

JUNE 2007
18-19 Hamiltonian Dynamical Systems and Applications Seminar, Montreal (355)
22 LMS Meeting, London

JULY 2007
2-6 Effective Computational Methods for Highly Oscillatory Problems Workshop, INI, Cambridge (353)
9-12 3-Manifold Geometry and Topology Symposium Workshop, Warwick (350)
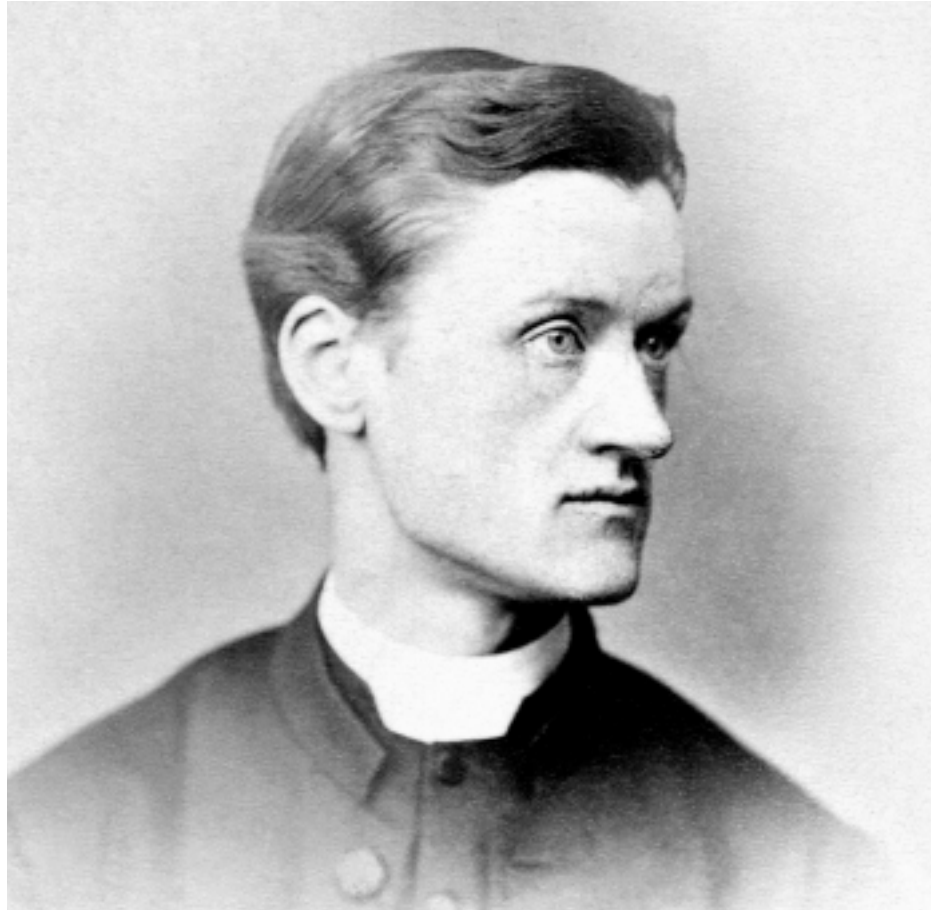**13-14** David Epstein 70th Birthday Celebration Symposium Workshop, Warwick (350)
16-20 ICIAM 2007, Zürich, Switzerland (349)
16-21 Hyperbolic Structures on 3-Manifolds and Large Scale Geometry of Teichmüller Space Symposium Workshop, Warwick (350)

AUGUST 2007
20-24 Analysis and Singularities Conference, Moscow (354)

A.J.C. ALLEN
LMS member 1879-1914

Rev. Andrew James Campbell Allen, MA, FCPS
Fellow of St Peter's College, Cambridge
Vicar of St. Mary the Less, Cambridge.