Department of Mathematics and Statistics

Faculty of Mathematics, Computing and Technology
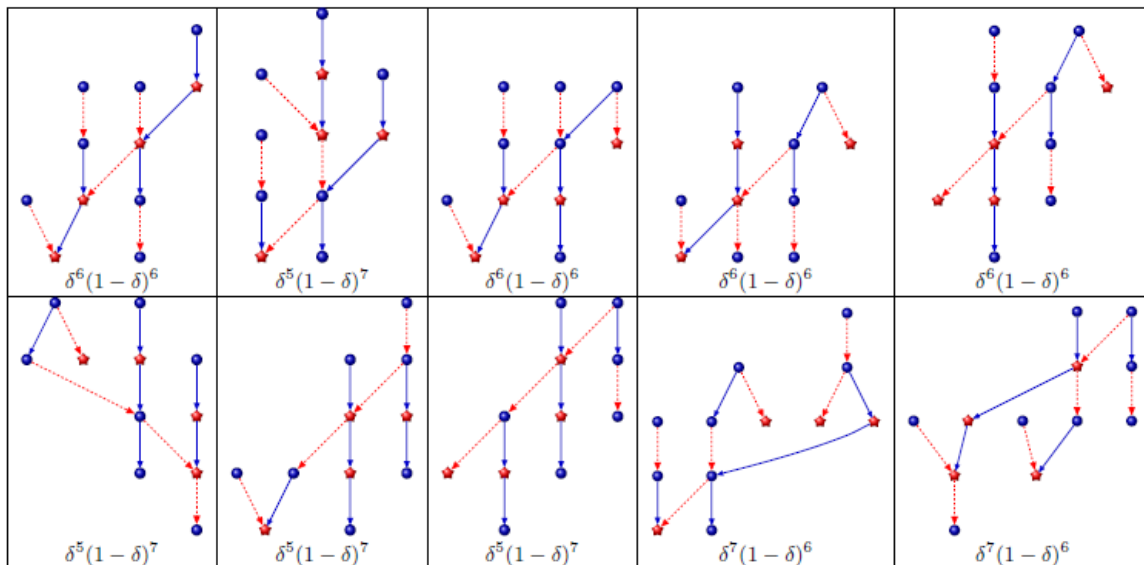
The Open University

Mathematics Research Report

2013

$\alpha\beta$ −trees. Used by Research Associate Nick Gill and collaborators to obtain lower bounds for the support of an element in a multiply transitive group that does not contain the alternating group. From Bamberg, John; Gill, Nick; Hayes, Thomas P.; Helfgott, Harald A.; Seress, Akos and Spiga, Pablo (2013). Bounds on the diameter of Cayley graphs of the symmetric group. Journal of Algebraic Combinatorics. DOI 10.1007/s10801-013-0476-3

Foreword

Welcome to the 2013 Mathematics Research Report which covers the Pure, Applied, History, and Mathematics Education groups in the Department of Mathematics and Statistics, in the Faculty of Mathematics, Computing and Technology, at the Open University. The Department also has a very strong Statistics group which publishes its own annual report – see http://statistics.open.ac.uk/2013_annual_report.

Research is a core part of our mission, and we foster a vibrant collaborative research culture encompassing academic staff, postdoctoral researchers and full- and part- time research students. The Department has key expertise in Combinatorics, Analysis and Geometry, Theoretical and Mathematical Physics, History of Mathematics in the 19th and early 20th Century, and topics in Mathematics Education.

In 2013, the Department joined the London Taught Course Centre (LTCC), and our postgraduate research students now attend lectures at De Morgan House in London. Our staff have also contributed courses to the Centre, with June Barrow-Green and Jeremy Gray teaching topics in the History of Mathematics, and Nick Gill delivering a course on Group Theory in the autumn.

We maintain an active programme of seminars and research days, which attract national and international participation. Particular highlights in 2013 included the annual Winter Combinatorics Meeting and Open Statistical Physics conference, as well as the inaugural Energy Research Day Conference, which is part of a faculty-wide energy research initiative. As well as the one-day meetings held on-campus, Phil Rippon and Gwyneth Stallard co-organised a highly successful workshop in May at the International Centre for Mathematical Sciences in Edinburgh. In November, two of our PhD students, Rosie Cretney and Mairi Walker, organised the 2013 Novembertagung (an annual meeting of postgraduate research students in the History of Mathematics) in De Morgan House, London.

We have continued to make significant contributions to the public awareness and understanding of science, in particular through collaborations with the BBC and by our annual Christmas Lecture for local schools, which this year was delivered by Katie Chicot. Several of our members were also involved in the organisation and policy development of learned societies, such as the London Mathematical Society, the Institute of Physics, and the British Society for the History of Mathematics.

Let me end by mentioning several highlights from OU Mathematics research in 2013. As well as numerous grants to support research visits, conferences and meetings, Gwyneth Stallard and Phil Rippon were awarded a further £225k from EPSRC to continue their work on Baker's conjecture and Eremenko's conjecture. 2013 also saw the publication of the first volume of *Aperiodic Order*, co-written by Uwe Grimm, and it is already set to become a standard reference in the study of quasicrystals. Finally, following its publication in 2012, Jeremy Gray's acclaimed book *Henri Poincaré: a scientific biography* was listed as one of Choice's "Outstanding Academic Titles for 2013".

Robert Brignall (Director of Research)

Membership of Mathematics Groups, 31 December 2013

Head of Department
Dr Toby O'Neil

Professor
Prof Jeremy Gray
Prof Uwe Grimm
Prof Philip Rippon
Prof Jozef Širáň
Prof Gwyneth Stallard
Prof Michael Wilkinson

Emeritus Professor
Prof David Brannan
Prof Mike Grannell
Prof Terry Griggs
Prof John Mason
Prof Robin Wilson

Senior Lecturer
Dr Barbara Allen
Dr June Barrow-Green
Dr Mick Bromilow
Dr Robert Hasson
Dr Ben Mestel
Dr Kathleen Quinn
Dr Andrey Umerski
Dr Bridget Webb

Lecturer
Dr Robert Brignall
Mr Matthew Esplen
Mr Michael Hall
Mr Gerard Hayes

Dr Tim Lowe
Dr Ian Short
Dr Paul Upton

Staff Tutor
Dr Silvia Barbina
Dr Katie Chicot
Ms Sally Crighton
Dr Martina Gibbons
Dr Gerry Golding
Mr Derek Goldrei
Ms Maggie Holland
Mrs Hilary Holmes
Mrs Phillis Jones
Dr Hayley Ryder
Mr Mike Simpson
Dr Claudi Thomas
Mr John Trapp
Dr Gareth Williams

Visiting Research Fellow
Dr David Crowe
Dr Tony Forbes
Dr Fred Holroyd
Dr Penelope Lynch

Research Associate
Dr Nick Gill
Dr Nicholas Korpelainen
Dr Dave Sixsmith

Visiting Research Associate
Dr John Osborne

Office Manager
Mrs Tracy Johns

Secretary
Ms Sara Griffin
Mrs Patricia Telford

Long-term visitor
Visiting Professor Michael Baake
Visiting Senior Research Fellow Dr Gerold Baier

Full-time research student
Mr David Bevan
Ms Rosanna Cretney
Mr Grahame Erskine
Miss Vasiliki Evdoridou
Mr Matthew Jacques
Mr David Marti Pete
Miss Mairi Walker
Mr Mark Whinnett

Part-time research student
Mr Walter Burke
Mr John Grant
Mr Rob Lewis
Mr Paul Verschueren

Visitors

Professor Sergey Kuznetsov (Russian Academy of Science and Saratov State University), 25 May – 7 June
Professor Einar Steingrimsson (University of Strathclyde), 25 – 28 February
Dr Vincent Vatter (University of Florida), 26 May – 7 June
Dr Pierre Guillot (University of Strasbourg) ,18 – 21 March
Professor Alan Beardon (University of Cambridge), 24 – 29 November
Professor Francoise Dal'Bo (University of Rennes 1), 12 – 13 December
Jean-Baptiste Aujogue (Lyon), 26 – 28 June
Professor Birgit Loch (Swinburne University of Technology), 15 – 19 July
Professor Mikhail Klin (Ben Gurion University of the Negev, Israel), 8 – 10 May
Professor Diane Donovan (University of Queensland), May
Dr John Britnell (Imperial College London), 29 January
Dr Amarpreet Rattan (Birkbeck University of London), 7 May

Research degrees awarded

Harry Kennard M.Phil. for his thesis *Dynamics in Turbulence*. Supervisors: Uwe Grimm & Andrey Umerski

Penny Lynch Ph.D. for her thesis *Mathematical modelling of the effects of health interventions on the evolution of life history in disease-causing organism.* Supervisor: Uwe Grimm

Dave Sixsmith Ph.D. for his thesis *Topics in Transcendental Dynamics.* Supervisors: Gwyneth Stallard & Phil Rippon

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Publications

Books

Bottazzini, Umberto and **Gray, Jeremy J**. *Hidden Harmony — Geometric Fantasies: The rise of complex function theory*. Sources and Studies in the History of Mathematics and Physical Sciences. Springer, Heidelberg 2013.

Gray, J Henri *Poincaré: a Scientific Biography*, Princeton University Press, Princeton 2012.

Baake, Michael and **Grimm, Uwe**. *Aperiodic Order. Vol 1. A Mathematical Invitation*. Encyclopedia of Mathematics and its Applications, 149. Cambridge University Press, Cambridge 2013.

Wilson, R. *Combinatorics: Ancient and Modern* (edited with J.J. Watkins). Oxford University Press, 2013.

Fauvel J, Flood R and **Wilson, R** (eds). *Oxford Figures: Eight Centuries of the Mathematical Sciences*, Second edition, Oxford University Press, 2013.

Wilson, R, *Four Colors Suffice* (revised color edition), Princeton Science Series, 2013.

Flood, R and **Wilson, R.** *The Great Mathematicians*, Arcturus, Portuguese and US high-school editions, 2013.

Articles and book chapters

Baake, Michael; Gähler, Franz and **Grimm, Uwe** (2013). Examples of substitution systems and their factors. Journal of Integer Sequences, 16(2) pp. 1–18.

Bamberg, John; **Gill, Nick**; Hayes, Thomas P.; Helfgott, Harald A.; Seress, Akos and Spiga, Pablo (2013). Bounds on the diameter of Cayley graphs of the symmetric group. Journal of Algebraic Combinatorics, DOI 10.1007/s10801-013-0476-3.

Balbuena, Camino; Miller, Mirka; **Širáň, Jozef;** Zdímalova, Maria (2013). Large vertex-transitive graphs from incidence graphs of biaffine planes. Discrete Math. 313 pp. 2014–2019.

Barrow-Green, June (2013). Merely a speculation of the mind? William Henry Fox Talbot and mathematics. In: Brusius, Mirjam; Dean, Katrina and Ramalingam, Chitra eds. William Henry Fox Talbot: Beyond Photography. Yale Center for British Art -Studies in British Art (23). United States: Yale University Press, pp. 67–94.

Bergweiler, Walter; **Rippon, Philip and Stallard, Gwyneth** (2013). Multiply connected wandering domains of entire functions. Proceedings of the London Mathematical Society 107 (6) pp. 1261–1301.

Donovan, D. M. and **Grannell, M. J.** (2013). On the number of transversal designs. Journal of Combinatorial Theory, Series A, 120(7) pp. 1562–1574.

Exoo, Geoff; Jajcay, Robert; **Širáň, Jozef** (2013). Cayley cages. J. Algebraic Combin. 38 pp. 209–224.

Forbes A.D. and Griggs T.S. (2013). Archimedean graph designs. Discrete Mathematics, 313 pp. 1138–1149.

Griggs T.S.; Psomas C. and Donovan D.M (2013). On biembedding an idempotent Latin square with its transpose. Acta Mathematica Universitatis Comenianae, 82 pp.11–20.

Gill, Nick (2013). Orientably regular maps with Euler characteristic divisible by few primes. Journal of the London Mathematical Society, 88(1) pp. 118–136.

Gill, Nick (2013). (2,m,n)-groups with Euler characteristic equal to $-2^a s^b$. Electronic Journal of Combinatorics, 20(3) article 8.

Gill, Nick; Pyber, László; **Short, Ian** and Szabó, Endre (2013). On the product decomposition conjecture for finite simple groups. Groups, Geometry, and Dynamics, 7(4) pp. 867–882.

Grannell, M. J.; **Griggs, T. S**.; Lo Faro, G. and Tripodi, A. (2013). Configurations in bowtie systems. Aequationes mathematicae, 85(3) pp. 347–358.

Grannell, M. J.; Griggs, T. S. and Lovegrove, G. J. (2013). Even-cycle systems with prescribed automorphism groups. Journal of Combinatorial Designs, 21(4) pp. 142–156.

Grannell, M. J. and Knor, M. (2013). Dihedral biembeddings and triangulations by complete and complete tripartite graphs. Graphs and Combinatorics, 29(4) pp. 921–932.

Grannell, Mike and Lovegrove, Graham (2013). Maximizing the number of Pasch configurations in a Steiner triple system. Bulletin of the Institute of Combinatorics and its Applications, 69 pp. 23–35.

Grannell, Mike J.; Griggs, Terry S.; Máčajová, Edita and Škoviera, Martin (2013). Coloring cubic graphs by point-intransitive Steiner triple systems. Journal of Graph Theory, 74(2) pp. 163–181.

Hayes, G, Cowan, T and **Allen, B**. (2013) Starting with Pythagoras' Theorem, Mathematics Teaching, 237, pp 45–47, November 2013.

Jones, Gareth A.; Macaj, Martin and **Širáň, Jozef** (2013). Nonorientable regular maps over linear fractional groups. Ars Mathematica Contemporanea, 6(1) pp. 25–35.

Korpelainen, Nicholas; Lozin, Vadim V. and Razgon, Igor (2013). Boundary properties of well-quasi-ordered sets of graphs. Order, 30(3) pp. 723–735.

Mestel, Benjamin D (2013). A short proof of the existence of universal functions. Real Analysis Exchange, 38(2) pp. 425–430.

Osborne J.W. (2013). Spiders' webs and locally connected Julia sets of transcendental entire functions, Ergodic Theory Dynam. Systems, 33 (4) pp. 1146–1161.

Osborne J.W. (2013). Connectedness properties of the set of points where the iterates of an entire function are bounded, Math. Proc. Camb. Phil. Soc., 155 pp. 391–410.

Pumir A. and **Wilkinson M.** (2013). A model for the shapes of advected triangles. J. Stat. Phys., 152 pp. 934 – 53.

Rippon P.J. and. Stallard G.M. (2013). Baker's conjecture and Eremenko's conjecture for functions with negative zeros. Journal d'Analyse Mathématique, 120 pp. 291–309.

Rippon, P. J. and Stallard, G. M. (2013). A sharp growth condition for a fast escaping spider's web. Advances in Mathematics, 244 pp. 337–353.

Rippon, P. J. and Stallard, G. M. (2013). Regularity and fast escaping points of entire functions. International Mathematics Research Notices, doi: 10.1093/imrn/rnt111/

Short, Ian (2013). Conformal automorphisms of countably connected regions. Conformal Geometry and Dynamics, 17 pp. 1–5.

Short, Ian and Gill, Nick (2013). Conjugacy in Thompson's group. Proceedings of the American Mathematical Society, 141 pp. 1529–1538.

Širáň, Jozef (2013). How symmetric can maps on surfaces be? In: Surveys in Combinatorics (London Mathematical Society Lecture Note Series 409), Cambridge University Press, pp. 161–238.

Sixsmith, Dave (2013). On fundamental loops and the fast escaping set. Journal of the London Mathematical Society, 88(3) pp. 716–736.

Webster, Roger and **Williams, Gareth** (2013). On the trail of Reverse Divisors: 1089 and all that follow. Mathematical Spectrum 45(3), pp 96–102.

Vosskule M. Lévèque E, **Wilkinson M,** A. Pumir (2013). Multiple Collisions in Turbulent Flows. Phys. Rev. E 88, *063008*.

Wilson, R. (2013). Early graph theory, Block designs (with N.L. Biggs), and Modern graph theory (with L.W. Beineke), chapters in Combinatorics: Ancient & Modern (ed. R. Wilson and J.J. Watkins), Oxford Univ. Press, 2013.

Wilson, R. (2013). Lewis Carroll in Numberland. Transactions of the Manchester Statistical Society, 2011–2012, pp. 38–48

Wilson R. and Flood R. (2013). The British Society for the History of Mathematics. European Mathematical Society Newsletter, March 2013, pp. 34–37.

Conferences/meetings organised by members of the Department

The Open University has a fine tradition of organising research meetings that draw national and international audience. Meetings organised by members of the Department held in 2013 were:

Winter Combinatorics Meeting, Open University, January 2013**.** Organisers: Robert Brignall, Kathleen Quinn, Bridget Webb and Jozef Širáň. http://wcm.open.ac.uk/

Open Statistical Physics, Open University, March 2013**.** Organisers: Michael Wilkinson, Uwe Grimm, Jim Hague and Paul Upton http://osp.open.ac.uk/osp_2013

Energy Research Day Conference, Open University, March 2013. Organisers: Ben Mestel and Bill Nuttall (DDEM, OU) http://mcs.open.ac.uk/energymeeting/energymeeting2013/

ICMS Workshop on The Role of Complex Analysis in Complex Dynamics, ICMS, Edinburgh, May 2013 Organisers: Phil Rippon, Gwyneth Stallard and Jim Langley (Nottingham) http://www.icms.org.uk/workshops/complexdynamics

Novembertagung on the History of Mathematics, De Morgan House, London. Organisers: Rosie Cretney and Mairi Walker. http://novembertagung.org/

Mathematics seminars hosted by the Department

In 2013 the Department held 33 Mathematics seminars, of which 5 (15 %) were given by women mathematicians. List of seminars in chronological order.

Thomas Jordan (University of Bristol) *Multifractal analysis for the continued fraction map and related dynamical systems*

David Chillingworth (University of Southampton) *Gravitational lensing and Galois theory*

John Britnell (Imperial College) *Orbit-coherence in permutation groups*

Giles Harrison (University of Reading) *Fair weather atmospheric electricity*

Jim Langley (University of Nottingham) *Non-real zeros of derivatives of meromorphic functions*

Mike Grannell (OU) *Beauty and the beast, or Projective and rigid Steiner triple systems*

Fred Holroyd (OU) *Peano arithmetic and the Hercules-Hydra game: a puzzle*

Pierre Guillot (University of Strasbourg) *Graphs on surfaces*

Nikita Sidorov (University of Manchester) *On a family of explicit counterexamples to the Finiteness Conjecture*

Pablo Shmerkin (University of Surrey) *On sets containing circles/squares centered at every point*

Tuomas Sahlsten (University of Bristol) *The Brownian graph is not round*

Michael Wilkinson (OU) *Two universalities in semiconductor physics*

Amarpreet Rattan (Birkbeck, University of London) *New formulae for structure constants in the symmetric group*

Mikhail Klin (Ben-Gurion University of the Negev, Israel) *Primitive triangle free strongly regular graphs, a survey: from Dale Mesner to recent results*

Chris Sangwin (University of Birmingham) *Using STACK through Moodle for mathematics assessment*

Neil Edwards (OU) *A brief descent from the elegance of ocean currents to the wicked world of climate change*

Sergey Kuznetsov (Russian Academy of Sciences, and Saratov State University, Russia) *Hyperbolic Chaos: A Physicist's View*

Eva-Maria Graefe (Imperial College) *Mean-field approximation for a many-particle system with complex-valued interaction strength*

Jesper Lützen (University of Copenhagen) *Impossibility theorems with special emphasis on the classical problems*

Tom Archibald (Simon Fraser University) *Integral equations 1900-1920: pure and applied dimensions of an explosively growing research specialty*

Mairi Walker (OU) *Rosen's solution to the word problem for the Hecke groups*

Matthew Jacques (OU) *Limit sets of semigroups of Möbius transformations*

Peter Fenton (University of Otago, New Zealand) *Subharmonic functions that are harmonic when they are large*

Alex Chroneos (OU) *Engineering defects in energy materials*

Silvia Barbina (OU) *Model theory*

Michael Wilkinson (OU) *The Puzzle of Planet Formation*

Ovidiu Bagdasar (University of Derby) *On the geometric patterns of complex Horadam sequences*

Lena Zuchowski (University of Cambridge) *Gestalt switches in the prize paper: An inspiration for (but not an instance of) chaos*

John Osborne (OU) *Connectedness properties of the set where the iterates of an entire function are bounded*

Andy Woods (BPI, University of Cambridge) *Fluid Mechanics for Carbon Sequestration*

Dave Sixsmith (OU) *The size of the Julia set of functions outside the Eremenko-Lyubich class*

Alan Beardon (University of Cambridge) *The Carathéodory Kernel Theorem*

Francoise Dal'Bo (University of Rennes 1) *Unipotent actions on compact quotients of SL(2,R): theme and variations*

Visits to other institutions

Robert Brignall and Nicholas Korpelainen University of Florida, USA

Nick Gill University of Bristol, UK

Terry Griggs Two visits to Charles University, Prague, February and November.

Uwe Grimm University of Bielefeld, Germany (several short visits)
Vassar College, Poughkeepsie, USA, June.

Michael Hall Helsinki University Viikki Teacher Training School

Jozef Širáň Ben Gurion University of the Negev, Israel

Dave Sixsmith University of Kiel, Germany

Michael Wilkinson ENS-Lyon, France

Gareth Williams Yale University and Cornell University, USA

Conference & workshop papers and posters given

Barbara Allen, Michael Hall and Gerald Hayes
Working enactively on mathematics tasks (2×1.5 hours sessions) ATM conference, Sheffield, April.
Anything Goves (1×1.5 hours session), ATM conference, Sheffield, April.

David Bevan
Permutation grid classes and the spectra of graphs, 24th British Combinatorial Conference, July.

June Barrow-Green
George Birkhoff and the Development of Dynamical Systems Theory. Morning Lecture, British Mathematics Colloquium, Sheffield, April.
Cambridge mathematicians and the First World War. Guest Lecturer, History of Mathematics Novembertagung, London, November.
T*he role of patronage in the development of applied mathematics in Britain, 1860–1920*. 24th International Congress of History of Science, Technology and Medicine. Manchester, July.

Robert Brignall
Forbidding paths and cliques at 24th British Combinatorial Conference, Royal Holloway, University of London, July.

Rosanna Cretney
From publications to letters and back again: Euler's early work on the Riccati equation BSHM Research in Progress, The Queen's College, Oxford
T*he role of patronage in the development of applied mathematics in Britain, 1860–1920*. 24th International Congress of History of Science, Technology and Medicine. Manchester, July.
Euler and the mathematics of ship-building Novembertagung on the History of Mathematics, De Morgan House, London, November.

Mike Grannell
Counting transversal designs, British Combinatorial Conference, Royal Holloway, July.
Embeddings of K_v *with uniform face sizes*, Geometrical and topological aspects of graph theory, Bristol, UK, April. (invited plenary talk)

Jeremy Gray
Henri Poincaré: Mathematician, Physicist, Philosopher,Keynote speaker (the Kenneth O. May Lecturer) at the Mathematical Association of America Mathfest, Hartford, Connecticut, August.
The soul of the fact: Poincaré and proof Invited speaker, 20th anniversary conference of the Erwin Schrödinger Institute, Vienna, April/May.
On the cusp of the new physics: Henri Poincare and mathematical physics 100 years ago Bernoulli Lecturer, the Bernoulli Society, Groningen, the Netherlands, March.
Henri Poincare and mathematical physics 100 years ago Distinguished Speaker at the European Mathematical Society meeting, Aarhus, Denmark, April.
On the cusp of the new physics: Henri Poincaré and mathematical physics one hundred years ago Invited speaker at the workshop on the history of mathematics, BMC, Sheffield, March.

Terry Griggs
Quandles and Design Theory, KAFKA seminar, Charles University Prague, February.
Biembedding Steiner triple systems using the Bose construction, Geometrical and topological aspects of graph theory, Bristol, UK, April 2013 (invited plenary talk).

Representing graphs in Steiner triple systems, British Combinatorial Conference, Royal Holloway, July.
Steiner triple systems and their close relatives, KAFKA seminar, Charles University Prague, November.

Uwe Grimm
The squiral tiling and its diffraction, SubTile 2013, CIRM, Marseille, France, January (contributed talk).
Recent advances in mathematical diffraction theory German Physical Society (DPG) Spring Meeting, Regensburg, Germany, March (invited topical talk).
Diffraction of the squiral tiling, Mini-Symposium Dynamical Systems, Bielefeld, Germany (25 April) (Invited talk).
Recent advances in mathematical diffraction theory, SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, USA, June (invited talk).
Recent progress in mathematical diffraction, 12th International Conference on Quasicrystals ICQ12, Kraków, Poland, September (invited tutorial).

Michael Hall (see also Barbara Allen's entry)
Mindfulness in the primary mathematics classroom (1 session of 90 minutes), Mindfulness conference –hosted by Forest School, Redbridge, for Preparatory Schools in England, May.
How far can you go with two digits? (1 session of 90 minutes) Norfolk mathematics Conference 2013**:** Infinity and Beyond – for Norfolk primary and secondary mathematics teachers, December.

Tim Lowe
Contemporary challenges for the delivery of undergraduate courses, HEA workshop at the British Mathematical Colloquium, Sheffield, April.

Dave Marti-Pete
Annular itineraries, Topological and Combinatorial Problems in One-dimensional Complex Dynamics. Pisa, Italy, October.
Annular itineraries*, Workshop on Holomorphic Dynamics*, Holbæk, Denmark, October.
Escaping points of transcendental functions Meeting: Graduate Student Meeting of the London Mathematical Society. CIPR, Russell Square, London. December.
Fast escaping points of holomorphic self-map, Complex Dynamics Working Seminar of the UB. Universitat de Barcelona, Barcelona (Spain), December.
A brief introduction to complex dynamics and how to produce nice pictures Meeting: Postgraduate Student Day of the Maths & Stats dept. of the OU Open University, Milton Keynes, December.

John Osborne
Connectedness properties of the set K(f) where the iterates of an entire function f are bounded, The Role of Complex Analysis in Complex Dynamics, ICMS, Edinburgh, May.

Phil Rippon
Applications of harmonic functions in complex dynamics, The Role of Complex Analysis in Complex Dynamics, ICMS, Edinburgh May.
Annular itineraries of entire functions, Topological and Combinatorial Problems in One-dimensional Complex Dynamics, Pisa, October.

Ian Short
On a conjecture of Lorentzen and Ruscheweyh, Complex Analysis and Approximation – A conference in honour of Anthony G. O'Farrell, June.

Jozef Širáň
Large vertex-transitive graphs of diameter two and given degree from finite projective planes, 7th Czech and Slovak Symposium in Graph Theory, July.
How symmetric can maps on surfaces be? British Combinatorial Conference, Royal Holloway, July (invited plenary lecture).
Regular maps on non-orientable surfaces, Geometric and Topological Graph Theory Workshop, Banff, Canada, October.
Regular maps on a given surface, 25th International Workshop in Topological Graph Theory, Yokohama, November (Invited plenary lecture).

Dave Sixsmith
The size of the Julia set of some families of functions outside the Eremenko-Lyubich class, The Role of Complex Analysis in Complex Dynamics, ICMS, Edinburgh May.
A new characterisation of the Eremenko-Lyubich class, One Day Function Theory Meeting, De Morgan House, London, June.

Gwyneth Stallard
Escaping to infinity, Two-day Women in Mathematics meeting at the Isaac Newton Institute, Cambridge, April.
Applications of the hyperbolic metric in complex dynamics, The Role of Complex Analysis in Complex Dynamics, ICMS, Edinburgh May.
Quite fast escaping points of transcendental entire functions, Topological and Combinatorial Problems in One-dimensional Complex Dynamics, Pisa, Italy, October.

Mairi Walker
Henry Roy Brahana and his Classification of Regular Maps. BSHM Research in Progress, Queen's College, Oxford March.
Rosen's solution to the word problem for Hecke groups. Postgraduate Group Theory conference, Manchester University July.
Poster entitled *Geodesic Rosen Continued Fractions* at Women in Mathematics event 18 –19 April.

Bridget Webb
Bachelors, monogamists and the Delta lemma International Workshop on Finite Fields Constructions of Combinatorial Arrays, Florianópolis, Brazil, April 21-27 (Invited plenary lecture).
Infinite designs - a quick tour, Combinatorics, Algebra, and More, A Conference in Celebration of Peter Cameron, Queen Mary, University of London, 8-10 July (Invited plenary lecture).

Michael Wilkinson
A test-tube model for rainfall, Interacting Particle Models in the Physical, Biological and Social Sciences, Warwick, April (invited speaker).
Non-collisional models for rainfall, SIAM conference on Applications of Dynamical Systems, Snowbird, May (invited speaker).
Non-collisional models for rainfall, Particles in Turbulence, Eindhoven, July (invited speaker).
Spectal dimension of inertial particles in turbulence, European Turbulence Conference 14, ENS-Lyon, September (contributed talk).
A test-tube model for rainfall, Particle Mediated Geophysical Flows, KITP, Santa Barbara, October (invited workshop participant).

Invited seminars and talks given

June Barrow-Green
"A Woman can win the victory, though she may not wear the wreath": women and mathematics in late 19th century Cambridge. Florence Nightingale Day, Lancaster University.
George Birkhoff and the Development of Dynamical Systems Theory. Scottish Topology Seminar, ICMS, Edinburgh.
George Birkhoff and the Development of Dynamical Systems Theory Imperial College, London.

Nick Gill
Quasirandom group actions, Imperial College, London.
The width of a finite simple group, Birkbeck College, University of London
Normal approximate group, University of Southampton.

Uwe Grimm
Singular continuous diffraction of the squiral tiling, ErgodicTheory & Dynamical Systems seminar, University of Warwick, April.
What is aperiodic order? Loughborough, December.

Nicholas Korpelainen
Boundary classes of graphs, University of Florida, USA, March.

Dave Sixsmith
A new characterisation of the Eremenko-Lyubich class, Christian-Albrechts-Universität zu Kiel, July.
The size of the Julia set of functions outside the Eremenko-Lyubich class, University of Warwick, November and University of Nottingham, December.

Jozef Širáň
Regular maps 1: Theory and construction. Ben Gurion University of the Negev, Israel, October.
Regular maps 2: Classification, Ben Gurion University of the Negev, Israel, November.
Regular maps, a brief survey. Bar Ilan University, Israel, November.

Michael Wilkinson
Two universalities in semiconductor physics, UCL, April.
Two universalities in semiconductor physics, University of Birmingham, June.
A test-tube model for rainfall, University of Bristol, October.

Other seminars and talks given

Matthew Jacques and David Bevan
Research talks to undergraduates at Cambridge University, November.

Editorial roles

June Barrow-Green
AMS History of Mathematics book series (Editorial Board member)
Historia Mathematica (Associate Editor)

Jeremy Gray
Archive for History of Exact Sciences (Joint Editor-in-Chief)
Science Networks (Editorial Board member)
Archimedes, New Studies in the History of Science and Technology (Editorial Board member)

Ian Short
Bulletin of the Irish Mathematical Society (Editorial Board member)

Jozef Širáň
Journal of Combinatorial theory Series B (Editorial Board member)
Acta Mathematica Contemporanea (Editorial Board member)
Australasian Journal of Combinatorics (Editorial Board member)
Mathematica Slovaca (Editorial Board member)
Acta Mathematica Universitatis Comenianae (Editorial Board member)

Gwyneth Stallard
Proceedings of the Edinburgh Mathematical Society (Subject Editor)

Major Grants awarded

Michael Hall
£58,000 from the London Schools Excellence Fund phase two funding, for a 5-term project working with NRICH at Cambridge University and a group of 20 primary schools in London. Focus of the project is development of mathematical subject knowledge and pedagogic knowledge. *Potential for research into effective CPD and mathematical knowledge in teaching*

Gwyneth Stallard and Phil Rippon
£224,007 awarded by the EPSRC to fund joint research (0.5 FTE each for two years) on the project "Baker's conjecture and Eremenko's conjecture: new directions"

Other Activities

Barbara Allen
Member of the Outer Circle of Advisory Committee for Mathematics Education

June Barrow-Green
Co-organiser of symposium on *The role of patronage in the development of applied mathematics in Britain, 1860–1920*. 24th International Congress of History of Science, Technology and Medicine. Manchester, July.
Joint organiser of *Geometry—From Euclid to Einstein*, a two day conference at Rewley House, Oxford.
Organiser of History of Mathematics Workshop, British Mathematical Colloquium, Sheffield, March.
Speed Mentor, International Day of the Girl, Southbank Centre.
Curious maths: finding the solution, Panel Discussion with Ian Stewart and Marcus du Sautoy, Royal Society Summer Science Exhibition..
Librarian for the London Mathematical Society

Katie Chicot
Member of British Science Association, Mathematics Committee: member of organising committee
Member of UKMT Council and Board of Directors, Chair of nominations committee.
Invited speaker at UKMT Mathematical Circles 'Cipher challenge'

Rosanna Cretney
Co-organiser of BSHM Research in Progress: one-day meeting at The Queen's College, Oxford

Nick Gill
Webmaster and associate member of the European Mathematical Society Committee for Developing Countries

Uwe Grimm
Co-organiser of Workshop on Combinatorial Physics http://mathsevents.cf.ac.uk/combphys2013/
Cardiff University, 17-19 December.

Michael Hall
Trustee and member of General Council of the ATM
Member of the ATM and MA primary mathematics working group
Member of Royal Society STEM Vision meeting

David Marti Pete
Mentor for the UK Mathematics Trust Senior Mentoring Scheme

Phil Rippon
BMC Scientific Committee

Gwyneth Stallard
Chair of the LMS Women in Mathematics Committee
Member of the LMS Good Practice Scheme Steering Group
LMS representative on the Athena Forum

Elected Fellow of the IMA (by invitation of its Council)
Co-organiser of two day "Women in Mathematics" meeting at the INI in Cambridge in April.

Robin Wilson
President of the British Society for the History of Mathematics.
Honorary Fellow of Gresham College, London.
Appointed Visiting Professor of Mathematics, London School of Economics, from 2013–16.

Michael Wilkinson
Ornstein-Uhlenbeck processes: spherical, triangular and anomalous, Dynamics Days Europe 2013, Madrid, June (minisymposium orgainiser, speaker)

Bridget Webb
Elected committee member of the British Combinatorial Committee.