

CV: Mark Kambites

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Career History

- 2011– **Senior Lecturer in Pure Mathematics**
School of Mathematics, University of Manchester, England
(Exceptional Performance Award (Extra Increment), 2012)
- 2010–2011 **Senior Research Fellow (RCUK Academic Fellow in Complexity)**
School of Mathematics, University of Manchester, England
- 2006–2010 **Research Fellow (RCUK Academic Fellow in Complexity)**
School of Mathematics, University of Manchester, England
- 2005–2006 **Marie Curie Intra-European Research Fellow**
Fachbereich Mathematik/Informatik, Universität Kassel, Germany
- 2003–2005 **Leverhulme Trust Postdoctoral Researcher**
School of Mathematics & Statistics, Carleton University, Canada
- 2000–2003 **Graduate Student and Teaching Assistant**
Department of Mathematics, University of York, England
- 1999 **Summer Research Scholar**
Edinburgh Parallel Computing Centre, University of Edinburgh, Scotland
- 1996–2000 **Undergraduate Student**
University of York, England

Academic Degrees

- 2003 **Ph.D. Pure Mathematics**
Department of Mathematics, University of York, England

Supervised by J. B. Fountain. Thesis *Combinatorial Aspects of Partial Algebras* successfully submitted after two years and eight months of study. K. M. Stott Prize for best thesis in mathematics at York.
- 2000 **M.Math. Mathematics & Computer Science (Class I*)**
Departments of Mathematics & Computer Science, University of York, England

First class honours with distinction. P. B. Kennedy Prize for best performance in mathematics final examinations. Ede & Ravenscroft Prize (jointly) for outstanding performance in final examinations across all departments of the University. Departmental prizes for best performance in 1st and 2nd year examinations.

Refereed Research Publications

1. Groups acting on semimetric spaces and quasi-isometries of monoids (with R. Gray). *Transactions of the American Mathematical Society* (to appear).
2. Green's \mathcal{J} -order and the rank of tropical matrices (with M. Johnson). *Journal of Pure and Applied Algebra* (to appear).
3. Tropical matrix duality and Green's \mathcal{D} relation (with C. Hollings). *Journal of the London Mathematical Society* (to appear).
4. A note on the definition of small overlap monoids. *Semigroup Forum* Vol. 83, 2011, pp. 499–512.
5. Free adequate semigroups. *Journal of the Australian Mathematical Society* Vol. 91, 2011, pp. 365–390.

6. A Švarc-Milnor lemma for monoids acting by isometric embeddings (with R. Gray). *International Journal of Algebra and Computation* Vol. 21, 2011, pp. 1135–1147.
7. Retracts of trees and free left adequate semigroups. *Proceedings of the Edinburgh Mathematical Society* Vol. 54, 2011, pp. 731–747.
8. On uniform decision problems and abstract properties of small overlap monoids. *International Journal of Algebra and Computation* Vol. 21, 2011, pp. 217–233.
9. Multiplicative structure of 2×2 tropical matrices (with M. Johnson). *Linear Algebra and its Applications* Vol. 435, 2011, pp. 1612–1625.
10. Semigroup automata with rational initial and terminal sets (with E. Render). *Theoretical Computer Science* Vol. 411, 2010, pp. 1004–1012.
11. Generic complexity of finitely presented monoids and semigroups. *Computational Complexity* Vol. 20, 2011, pp. 21–50.
12. Small overlap monoids II: automatic structures and normal forms. *Journal of Algebra* Vol. 321, 2009, pp. 2302–2316.
13. On groups and counter automata (with M. Elder and G. Ostheimer). *International Journal of Algebra and Computation* Vol. 18, 2008, pp. 1345–1364.
14. Small overlap monoids I: the word problem. *Journal of Algebra* Vol. 321, 2009, pp. 2187–2205.
15. Rational subsets of polycyclic monoids and valence automata (with E. Render). *Information and Computation* Vol. 207, 2009, pp. 1329–1339.
16. Church-Rosser groups and growing context-sensitive groups (with F. Otto). *Journal of Automata, Languages and Combinatorics* Vol. 13, 2008, pp. 249–267.
17. Graph products of right cancellative monoids (with J. B. Fountain). *Journal of the Australian Mathematical Society*, Vol. 87, 2009, pp. 227–252.
18. Polycyclic and bicyclic valence automata (with E. Render). In the *Proceedings of the 2nd International Conference on Language and Automata Theory and Applications (LATA 2008)*, *Lecture Notes in Computer Science* Vol. 5196, 2008, pp. 464–475.
19. On commuting elements and embeddings of graph groups and monoids. *Proceedings of the Edinburgh Mathematical Society*, Vol. 52, 2009, pp. 155–170.
20. The loop problem for Rees matrix semigroups. *Semigroup Forum* Vol. 76, 2008, pp. 204–216.
21. Formal languages and groups as memory. *Communications in Algebra*, Vol. 37, 2009, pp. 193–208.
22. The loop problem for monoids and semigroups. *Mathematical Proceedings of the Cambridge Philosophical Society*, Vol. 143, 2007, pp. 271–289.
23. On the rational subset problem for groups (with P. V. Silva and B. Steinberg). *Journal of Algebra*, Vol. 309, 2007, pp. 622–639.
24. Wreath product decompositions for triangular matrix semigroups (with B. Steinberg). In the *Proceedings of the International Conference on Semigroups and Languages, Lisbon 2005*, pp. 129–144.
25. On the Krohn-Rhodes complexity of semigroups of upper triangular matrices. *International Journal of Algebra and Computation*, Vol. 17, 2007, No. 1, pp. 187–201.
26. Automatic Rees matrix semigroups over categories. *Semigroup Forum* Vol. 74, 2007, pp. 159–190.
27. The spectra of lamplighter groups and Cayley machines (with P. V. Silva and B. Steinberg). *Geometriae Dedicata*, Vol. 120, 2006, No. 1, pp. 193–227.
28. Word problems recognisable by deterministic blind monoid automata. *Theoretical Computer Science*, Vol. 362, 2006, pp. 232–237.
29. Uniform decision problems for automatic semigroups (with F. Otto). *Journal of Algebra*, Vol. 303, No. 2, 2006, pp. 789–809.

30. Automatic semigroups and categories. *Theoretical Computer Science*, Vol. 353, 2006, pp. 272–290.
31. Faithful functors from cancellative categories to cancellative monoids with an application to abundant semigroups (with V. A. R. Gould). *International Journal of Algebra and Computation*, Vol. 15, No. 4, 2005, pp. 683–698.
32. Presentations for semigroups and semigroupoids. *International Journal of Algebra and Computation*, Vol. 15, No. 2, 2005, pp. 291–308.
33. Hyperbolic groups and completely simple semigroups (with J. B. Fountain). In the *Proceedings of the Workshop on Semigroups and Languages*, Lisbon 2002, pp. 106–132.
34. An OpenMP-like Interface for Parallel Programming in Java (with J. M. Bull and J. Obdržálek). *Concurrency and Computation: Practice and Experience*, Vol. 13, No. 8–9, July 2001, pp. 793–814.
35. Towards OpenMP for Java (with J. M. Bull, J. Obdržálek and M. Westhead). In the *Proceedings of the 2nd European Workshop on OpenMP*, September 2000, pp. 98–105.
36. JOMP - an OpenMP-like interface for Java (with J. M. Bull). In the *Proceedings of the ACM 2000 Java Grande Conference*, June 2000, pp. 44–53.

Preprints and Papers Submitted

1. Quasi-isometry and finite presentations of left cancellative monoids (with R. D. Gray). Preprint, April 2012, [arXiv:math.GR/1204.2384](https://arxiv.org/abs/math/1204.2384).
2. Tropical matrix groups (with Z. Izhakian and M. Johnson). Preprint, March 2012, [arXiv:math.GR/1203.2449](https://arxiv.org/abs/math/1203.2449).
3. Idempotent tropical matrices and finite metric spaces (with M. Johnson). Preprint, March 2012, [arXiv:math.RA/1203.2480](https://arxiv.org/abs/math/1203.2480).
4. Pure dimension and projectivity of tropical polytopes (with Z. Izhakian and M. Johnson). Submitted, [arXiv:math.RA/1106.4525](https://arxiv.org/abs/math/1106.4525).

Software

1. SmallOverlap (package for the GAP4 computer algebra system implementing efficient algorithms for computing with monoid and semigroup presentations satisfying small overlap conditions).
2. JOMP (compiler and runtime support library to facilitate parallel programming in Java using a variant of the OpenMP standard; has been used and extended by researchers around the world; further development is a continuing research project at the Edinburgh Parallel Computing Centre).

Selected Talks and Invited Participations

- Invited talk at *NSAC 2013*, Novi Sad, June 2013.
- Invited talk at *Semigroups and Applications*, Uppsala, August 2012.
- Invited talk at *Minisymposium on Max-algebra at SIAM Conference on Applied Linear Algebra*, Valencia, June 2012.
- Contributed talk at *Groups and Semigroups: Interactions and Computations*, Lisbon, July 2011.
- Invited talk at *LMS Network Meeting on Tropical Mathematics and its Applications*, Birmingham, June 2011.
- Invited talk at the *North British Semigroups and Applications Meeting*, St Andrews, May 2011.
- Pure Mathematics Colloquium, University of Sheffield, March 2011.
- Invited talk at the *North British Geometric Group Theory Meeting*, Edinburgh, December 2010.
- Lisbon Algebra Seminar, University of Lisbon, September 2010.
- Invited talk at *Topics in Algorithmic and Geometric Group and Semigroup Theory*, CRM Montreal, August 2010.

- Algebra Seminar, University of Glasgow, January 2010.
- Pure Mathematics Colloquium, University of Southampton, November 2009.
- Optimisation and Numerical Analysis Seminar, University of Birmingham, October 2009.
- Invited talk at the *International Conference on Semigroups and Related Topics*, Porto, Portugal, July 2009.
- Bristol Algebra and Geometry Seminar, University of Bristol, May 2009.
- Invited talk at the *International Conference on Geometric and Combinatorial Methods in Group Theory and Semigroup Theory*, Lincoln, Nebraska, May 2009.
- Invited talk at the *North British Semigroups and Applications Meeting*, St Andrews, April 2009.
- Newcastle Geometry and Algebra Seminar, Newcastle University, November 2008.
- Invited talk at *Semigroups and Groups in Essex (SAGE)*, University of Essex, August 2008.
- Mathematics Seminar, National University of Ireland, Galway, May 2008.
- Invited talk in *Splinter Group on Semigroup Theory, 60th British Mathematical Colloquium*, York, March 2008
- Fully-funded participant in *ARCC Workshop on Generic Case Complexity*, American Institute of Mathematics, Palo Alto, California, August 2007.
- Pure Mathematics Seminar, University of York, May 2007.
- Invited talk in *Special Session on Languages and Groups, AMS Sectional Meeting*, New York, April 2007.
- Invited talk at *Languages, Automata, Groups, Complexity and Cryptography*, New York, April 2007.
- Pure Mathematics Colloquium, University of St Andrews, November 2006.
- Invited talk at the *North British Geometric Group Theory Meeting*, Edinburgh, November 2006.
- Invited talk at *Fountainfest: Semigroups, Categories and Automata*, York, October 2006.
- Invited talk at *Categories and Semigroups Workshop*, Calgary, June 2006.
- Contributed talk at the *International Conference on Semigroups and Languages*, Lisbon, July 2005.
- Invited talk in *Special Session on Semigroups, AMS Sectional Meeting*, Nashville Tennessee, October 2004.
- Contributed talk at the *International Meeting on Semigroup Theory and Related Topics*, Braga, Portugal, June 2003.

Grants and Fellowships

- Principal (sole) investigator on EPSRC project *Multiplicative Structure of Tropical Matrix Algebra* (2009–2012, total FEC value £365,532).
- Co-investigator on EPSRC project *Tropical Algebraic Methods in Numerical Matrix Analysis* (extension project to Dr. Françoise Tisseur’s Leadership Fellowship, 2012–2014, total value £240,967 between two investigators).
- Co-investigator on Manchester’s EPSRC *Mathematics Platform Grant* (total value £525,988 between twelve investigators).
- Co-investigator on EPSRC project *Quantum Computation: Foundations, Security, Cryptography and Group Theory* (2008–2011, total value £277,340 between five investigators at Manchester, Heriot-Watt and Newcastle).
- Named researcher on Manchester’s successful EPSRC bid to establish the *Centre for Interdisciplinary Computational and Dynamical Analysis (CICADA)* (2007–2011, total value £1,754,108).
- *RCUK Academic Fellowship in Complexity*, contribution to salary for five year research fellowship (2006–2011, total value £125,000).

- *London Mathematical Society Scheme 3 Grant* to organise the *North British Semigroups and Applications Network* (2008–, £1,050 per annum renewable).
- *European Union Marie Curie Intra-European Fellowship*, full salary and expenses for postdoctoral research at Universität Kassel, Germany (2005–2006, total value €112,272).
- *Leverhulme Trust Study Abroad Award*, stipend and expenses for postdoctoral research at Carleton University, Canada (2003–2005, total value £26,447).
- *London Mathematical Society Scheme 2 Grant* to host visit of Professor Gretchen Ostheimer (2007, £1,200).
- Other small grants, before arriving in Manchester, for conference organisation and attendance, from organisations including the *London Mathematical Society* and *NATO*.

Research Supervision and Examination

- Currently supervising postdoctoral research associate Marianne Johnson (2010–).
- Currently supervising PhD student David Wilding (2011–).
- Supervised postdoctoral research associate Philip Bridge (2012).
- Supervised postdoctoral research associate Christopher Hollings (2009–2010, currently employed at the University of Oxford).
- Supervised PhD student Elaine Render (2006–2010, currently employed at the University of California at Los Angeles).
- Currently supervising MSc dissertation of Maria Mir.
- Supervised MSc dissertation of David Wilding (2011).
- Supervised MSc dissertation of James Redhead (2010).
- Supervised MSc dissertation of Katharine Barr (2009).
- Supervised MSc dissertation of Peter Walker (2008).
- External examiner for PhD candidate Claire Cornock (University of York, 2011).
- External examiner for PhD candidate Rebecca Noonan Heale (Heriot-Watt University, 2010).
- External examiner for PhD candidate Jonathan Longrigg (Newcastle University, 2008).
- Internal examiner for PhD candidate Philip Bridge (Manchester, 2011).

Editorial Work, Reviewing and Panel Membership

- Associate Editor of *Communications in Algebra* (2009–).
- Regular grant proposal reviewer for EPSRC.
- Member of Leadership/Career Acceleration Fellowship shortlisting panel for EPSRC (November 2010).
- Regular article reviewer for *Mathematical Reviews* and *MathSciNet*.
- Referee for journals including the *Proceedings of the Edinburgh Mathematical Society*, *Communications in Algebra, Information and Computation*, *Linear Algebra and its Applications*, the *International Journal of Algebra and Computation*, *Informatique Théorique et Applications* and *Semigroup Forum*, as well as numerous conferences and proceedings volumes.

Event Organisation

- Local organising committee member for *Logic Colloquium 2012* (Manchester, July 2012).
- Scientific committee member for the *83rd Arbeitstagung Allgemeine Algebra* (Novi Sad, March 2012).
- Co-organised *Future Directions in Tropical Mathematics and its Applications* (Manchester, January 2012).
- Organising committee member (invited by the Royal Society) for the third *UK-Germany Frontiers of Science* symposium (Chicheley Hall, May 2011).
- Co-organised a *Meeting on Tropical Mathematics and its Applications* (Manchester, April 2011).
- Grant holder and central organiser for the *North British Semigroups and Applications Network* (NBSAN). Organised one-day meetings in Manchester in July 2010, August 2011, April 2012.
- Co-organised the *Splinter Group and Satellite Seminar on Semigroup Theory* at the *60th British Mathematical Colloquium* (York, March 2008).
- Organised a meeting of the *North British Geometric Group Theory Network* (Manchester, October 2007).
- Organised a one-day exploratory meeting on algebraic cryptography (Manchester, January 2007).
- Co-organised the international *Fountainfest* conference on semigroups, categories and automata (York, October 2006).
- Devised and co-organised the *1st North-Eastern Postgraduate Pure Mathematics Workshop* (York, July 2003).

Lecturing

- COMP11120 Mathematical Techniques for Computer Science (Manchester, 2011–12). Feedback scores pending.
- MATH43011/63011 Computation and Complexity (Manchester, 2011–12). MSc/MMath course also attended by PhD students. Feedback scores (on University scale from 1 to 5, best possible score 1): 1.05 for teaching excellence, 1.35 for overall course quality.
- MATH43012/63012 Computation and Complexity (Manchester, 2010–11). MSc/MMath course also attended by PhD students. Feedback scores (on University scale from -2.00 to 2.00, best possible score 2.00): 1.50 for teaching excellence, 1.50 for overall course quality.
- MATH43012/63012 Computation and Complexity (Manchester, 2009–10). MSc/MMath course also attended by PhD students. Feedback scores (on University scale from -2.00 to 2.00, best possible score 2.00): 2.00 for teaching excellence, 2.00 for overall course quality.
- MATH43012/63012 Computational Complexity (Manchester, 2008–09). MSc/MMath course also attended by PhD students. Feedback scores (on University scale from -2.00 to 2.00, best possible score 2.00): 1.80 for teaching excellence, 1.60 for overall course quality.
- Advanced Algebra (York, 2002–03). Third year undergraduate course.

Miscellaneous Teaching Activities

- Supervisions for course MATH10202 Linear Algebra (2009–10).
- Supervisions for course MATH10111 Sets, Numbers and Functions (2007–08, 2011–).
- Supervised MSc project of Joseph Tucker (2009), Michael Jones (2012).
- Supervised undergraduate projects of Liam Hastings (2011), Charles Johncox-Som (2011), James Gay (2012).
- Conducted internal module reviews and teaching observations (2008–).
- Examined undergraduate projects and MSc dissertations (2007–).
- Seminars and problems classes for numerous undergraduate modules (York, 2000–03).

Administrative Service

- Undergraduate Admissions Tutor (2011–)
- Member of School of Mathematics Research Committee (2010–)
- Member of School of Mathematics Research Funding Allocation Committee (2010–)
- Organised Tropical Mathematics Seminar and Reading Group (2009–)

Selected Training and Professional Development

- University of Manchester *Training in Conducting Performance and Development Reviews* (half day, May 2012)
- University of Manchester *Training in Effective Recruitment and Selection* (one day, January 2011)
- Royal Society *Public Communication and Media Training* (two days, June 2010)
- Royal Institution *Introduction to News Media* (one day, November 2009)
- Higher Education Academy MSOR *New Lecturers' Induction Course* (two days, September 2008)
- EPSRC *Grantsmanship* training for funding applications (one day, November 2006)
- University of Manchester *Training in Equality and Diversity Issues* (one day, November 2007)
- University of Manchester *New Academics Programme* (2007–2009)

External Bodies

- Member of the *London Mathematical Society*.
- Member of the *Institute of Mathematics and its Applications*.
- Manchester representative for the *British Combinatorial Bulletin*.

Outreach Work

- Academic project supervisor for *Making Maths at Manchester*, a two-day course which brings the most talented Year 12 school students into the University to experience the creative side of mathematics (2010–).
- Worked with Year 12 and Year 13 students at Chetham's School, Manchester, giving talks about mathematics and university study (2009).
- Academic tutor for the *Manchester Access Programme*, which helps and encourages pupils from underrepresented backgrounds to enter higher education by involving them in activities at the University (2006–08).

Referees

Available on request.