Mark Kambites

Professor and Head of Pure Mathematics

School of Mathematics, University of Manchester

Address:	School of Mathematics	Web:	www.maths.manchester.ac.uk/~mkambites/
	University of Manchester		
	Manchester M13 9PL	Email:	Mark.Kambites@manchester.ac.uk
	England		

Career History

2016–   **Professor and Head of Pure Mathematics**
School of Mathematics, University of Manchester, England

2015–2016   **Reader and Head of Pure Mathematics**
School of Mathematics, University of Manchester, England

2013–2015   **Reader in Pure Mathematics**
School of Mathematics, University of Manchester, England

2011–2013   **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. Face monoid actions and tropical hyperplane arrangements (with M. Johnson), *International Journal of Algebra and Computation* (to appear). `arXiv:math.CO/1604.03016`.

2. Amenability and geometry of semigroups (with R. D. Gray). *Transactions of the American Mathematical Society* Vol. 369, 2017, pp. 8087-8103.

3. Pure dimension and projectivity of tropical polytopes (with Z. Izhakian and M. Johnson), *Advances in Mathematics* Vol. 303, 2016, pp.1236–1263.

4. Tropical matrix groups (with Z. Izhakian and M. Johnson). *Semigroup Forum* (to appear). `arXiv:math.GR/1203.2449`.

5. Convexity of tropical polytopes (with M. Johnson). *Linear Algebra and its Applications* Vol. 485, 2015, pp. 531–544.

6. A large class of sofic monoids. *Semigroup Forum* Vol. 91, 2015, pp. 282–294.

7. A strong geometric hyperbolicity property for directed graphs and monoids (with R. Gray). *Journal of Algebra* Vol. 420, 2014, pp. 373–401.

8. The word problem for free adequate semigroups (with A. Kazda). *International Journal of Algebra and Computation* Vol. 24, 2014, pp. 893–907.

9. Anisimov's Theorem for inverse semigroups. *International Journal of Algebra and Computation* Vol. 25, 2015, pp. 41–49.

10. Exact rings and semirings (with M. Johnson and D. Wilding). *Journal of Algebra* Vol. 388, 2013, pp. 324–337.

11. Quasi-isometry and finite presentations of left cancellative monoids (with R. D. Gray). *International Journal of Algebra and Computation* Vol. 23, 2013, pp.1099-1114.

12. Idempotent tropical matrices and finite metric spaces (with M. Johnson). *Advances in Geometry* Vol. 14, 2014, pp. 253–276.

13. Groups acting on semimetric spaces and quasi-isometries of monoids (with R. Gray). *Transactions of the American Mathematical Society* Vol. 365, 2013, pp. 555–578.

14. Green's $\mathcal{J}$-order and the rank of tropical matrices (with M. Johnson). *Journal of Pure and Applied Algebra* Vol. 217, 2013, pp. 280–292.

15. Tropical matrix duality and Green's $\mathcal{D}$ relation (with C. Hollings). *Journal of the London Mathematical Society* Vol. 86, 2012, pp. 520–538.

16. A note on the definition of small overlap monoids. *Semigroup Forum* Vol. 83, 2011, pp. 499–512.

17. Free adequate semigroups. *Journal of the Australian Mathematical Society* Vol. 91, 2011, pp. 365–390.

18. 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.

19. Retracts of trees and free left adequate semigroups. *Proceedings of the Edinburgh Mathematical Society* Vol. 54, 2011, pp. 731–747.

20. On uniform decision problems and abstract properties of small overlap monoids. *International Journal of Algebra and Computation* Vol. 21, 2011, pp. 217–233.

21. Multiplicative structure of 2×2 tropical matrices (with M. Johnson). *Linear Algebra and its Applications* Vol. 435, 2011, pp. 1612–1625.

22. Semigroup automata with rational initial and terminal sets (with E. Render). *Theoretical Computer Science* Vol. 411, 2010, pp. 1004–1012.

23. Generic complexity of finitely presented monoids and semigroups. *Computational Complexity* Vol. 20, 2011, pp. 21–50.

24. Small overlap monoids II: automatic structures and normal forms. *Journal of Algebra* Vol. 321, 2009, pp. 2302–2316.

25. On groups and counter automata (with M. Elder and G. Ostheimer). *International Journal of Algebra and Computation* Vol. 18, 2008, pp. 1345–1364.

26. Small overlap monoids I: the word problem. *Journal of Algebra* Vol. 321, 2009, pp. 2187–2205.

27. Rational subsets of polycyclic monoids and valence automata (with E. Render). *Information and Computation* Vol. 207, 2009, pp. 1329–1339.

28. Church-Rosser groups and growing context-sensitive groups (with F. Otto). *Journal of Automata, Languages and Combinatorics* Vol. 13, 2008, pp. 249–267.

29. Graph products of right cancellative monoids (with J. B. Fountain). *Journal of the Australian Mathematical Society*, Vol. 87, 2009, pp. 227–252.

30. 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.

31. On commuting elements and embeddings of graph groups and monoids. *Proceedings of the Edinburgh Mathematical Society*, Vol. 52, 2009, pp. 155–170.

32. The loop problem for Rees matrix semigroups. *Semigroup Forum* Vol. 76, 2008, pp. 204–216.

33. Formal languages and groups as memory. *Communications in Algebra*, Vol. 37, 2009, pp. 193–208.

34. The loop problem for monoids and semigroups. *Mathematical Proceedings of the Cambridge Philosophical Society*, Vol. 143, 2007, pp. 271–289.

35. On the rational subset problem for groups (with P. V. Silva and B. Steinberg). *Journal of Algebra*, Vol. 309, 2007, pp. 622–639.

36. 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.

37. 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.

38. Automatic Rees matrix semigroups over categories. *Semigroup Forum* Vol. 74, 2007, pp. 159–190.

39. 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.

40. Word problems recognisable by deterministic blind monoid automata. *Theoretical Computer Science*, Vol. 362, 2006, pp. 232–237.

41. Uniform decision problems for automatic semigroups (with F. Otto). *Journal of Algebra*, Vol. 303, No. 2, 2006, pp. 789–809.

42. Automatic semigroups and categories. *Theoretical Computer Science*, Vol. 353, 2006, pp. 272–290.

43. 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.

44. Presentations for semigroups and semigroupoids. *International Journal of Algebra and Computation*, Vol. 15, No. 2, 2005, pp. 291–308.

45. 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.

46. 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.

47. 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.

48. 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. Linear isomorphisms preserving Green's relations for matrices over semirings (with A. Guterman and M. Johnson), Preprint, September 2017, `arXiv:math.RA/1709.05277`.

2. On cogrowth, amenability and the spectral radius of a random walk on a semigroup (with R. D. Gray), Preprint, June 2017, `arXiv:math.GR:1706.01313`.

3. Identities in upper triangular matrix semigroups and the bicyclic monoid (with L. Daviaud and M. Johnson), Preprint, December 2016. `arXiv:math.RA/1612.04219`.

4. NP-completeness in the gossip monoid (with P. Fenner and M. Johnson), Preprint, June 2016, `arXiv:math.CO/1606.01206`.

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 participant and speaker in the *Research Program on Tropical Geometry, Amoebas and Polytopes*, Institut Mittag-Leffler, Stockholm, 2018.

- Invited talk in the *Special Session on Semigroups at AAA94+NSAC2017*, Novi Sad, Serbia, June 2017.

- Mathematics Seminar, UCLAN, March 2017.

- Algebra, Combinatorics, Measure Seminar, Lancaster University, October 2016.

- Algebra, Logic and Algorithms Seminar, University of Leeds, September 2016.

- Invited talk at the *ICMS Workshop on Computation in Geometric and Combinatorial Group Theory*, Edinburgh, July 2016.

- Invited talk at the *International Conference on Semigroups and Automata* (*CSA 2016*), Lisbon, June 2016.

- Invited participant (fully funded) at the *Durham Symposium on Permutation Groups and Transformation Semigroups*, Durham, July 2015.

- Invited talk in *Special Session on New Trends in Automata Groups and Semigroups, Joint Meeting of the American, European and Portuguese Mathematical Societies*, Porto, Portugal, June 2015.

- Invited talk in *Special Session on the Algebraic Theory of Semigroups and Applications, Joint Meeting of the American, European and Portuguese Mathematical Societies*, Porto, Portugal, June 2015.

- Algebra Seminar, University of St Andrews, January 2015.

- Pure Mathematics Seminar, University of East Anglia, February 2014.

- Leeds Pure Mathematics Colloquium, University of Leeds, November 2013.

- Invited talk at the *International Conference on Geometric, Combinatorial and Dynamics aspects of Semigroup and Group Theory*, Tel Aviv, Israel, June 2013.

- Invited talk at *NSAC 2013*, Novi Sad, Serbia, June 2013.

- Newcastle Algebra and Geometry Seminar, University of Newcastle, February 2013.

- Algebra and Topology Seminar, Swansea University, February 2013.

- Pure Mathematics Colloquium, University of St Andrews, January 2013.

- Bristol Algebra and Geometry Seminar, University of Bristol, October 2012.

- Invited talk at *Semigroups and Applications*, Uppsala, Sweden, August 2012.

- Invited talk at the *North British Semigroups and Applications Meeting*, Edinburgh, July 2012.

- Invited talk at *Minisymposium on Max-algebra* at *SIAM Conference on Applied Linear Algebra*, Valencia, Spain, June 2012.

- Contributed talk at *Groups and Semigroups: Interactions and Computations*, Lisbon, Portugal, 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, Portugal, September 2010.

- Invited talk at *Topics in Algorithmic and Geometric Group and Semigroup Theory*, CRM Montreal, Canada, 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, USA, 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, Ireland, 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, USA, August 2007.

- Pure Mathematics Seminar, University of York, May 2007.

- Invited talk in *Special Session on Languages and Groups, AMS Sectional Meeting*, New York, USA, April 2007.

- Invited talk at *Languages, Automata, Groups, Complexity and Cryptography*, New York, USA, 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, Canada, June 2006.

- Contributed talk at the *International Conference on Semigroups and Languages*, Lisbon, Portugal, July 2005.

- Invited talk in *Special Session on Semigroups, AMS Sectional Meeting*, Nashville, Tennessee, USA, October 2004.

- Contributed talk at the *International Meeting on Semigroup Theory and Related Topics*, Braga, Portugal, June 2003.

Grants and Fellowships

- Co-investigator on EPSRC project *Tropical Algebraic Methods in Numerical Matrix Analysis* (extension project to Dr. Francoise Tisseur's Leadership Fellowship, 2012–2014, total value £240,967 between two investigators).

- Co-investigator on Manchester's EPSRC *Mathematics Platform Grant* (2011–2015, total value £525,988 between twelve investigators).

- Principal (sole) investigator on EPSRC project *Multiplicative Structure of Tropical Matrix Algebra* (2009–2013, total FEC value £365,532).

- 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).

- *London Mathematical Society Scheme 3 Grant* to organise the *North British Semigroups and Applications Network* (annual renewable grant, £1,050 per annum from 2008–2012, £1,500 per annum from 2012–).

- *RCUK Academic Fellowship in Complexity*, contribution to salary for five year research fellowship (2006–2011, total value £125,000).

- *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 PhD student Peter Fenner (2014–, jointly with M. Johnson).

- Supervised postdoctoral research associates Christopher Hollings (2009–2010, went on to permanent lectureship at the University of Oxford), Marianne Johnson (2010–2013, went on to permanent lectureship at the University of Manchester), Philip Bridge (2012) and Markus Pfeiffer (2012–2013, went on to postdoctoral research at the University of St Andrews), James Hook (2012–2014, jointly with F. Tisseur, went on to Prize Fellowship at the University of Bath) and Meisam Sharify (2013–2014, jointly with F. Tisseur, went on to Assistant Professorship at Isfahan University of Technology).

- Supervised PhD students Elaine Render (2006–2010, went on to postdoctoral research at the University of California at Los Angeles) and David Wilding (2011–2014, went on to work for Mentor Graphics), Matthew Taylor (2012–2016, went on to work for Sports Interactive).

- Supervised MSc dissertations of Benjamin Tilley (2013), Maria Mir (2012), David Wilding (2011), James Redhead (2010), Katharine Barr (2009) and Peter Walker (2008).

- External examiner for PhD candidates Gabriela Nesin (University of Leicester, 2015), Jenni Awang (University of St Andrews, 2014), Simon Craik (University of St Andrews, 2013), Claire Cornock (University of York, 2011), Rebecca Noonan Heale (Heriot-Watt University, 2010) and Jonathan Longrigg (Newcastle University, 2008).

- Internal examiner for PhD candidates Francisco Lobo (University of Manchester, 2013) and Philip Bridge (University of Manchester, 2011).

- Chair of examining committee for PhD candidate Martin Adamcik (University of Manchester, 2014).

Editorial Work, Reviewing and Panel Membership

- Associate Editor of *Communications in Algebra* (2009–).

- Member of EPSRC Peer Review College (2012–)

- Served on EPSRC Prioritisation Panels (November 2010, September 2012, September 2015) and Fellowships Interview Panel (July 2017).

- Regular grant proposal reviewer for EPSRC.

- Prioritisation panel member for the Academy of Finland (February 2016).

- Regular grant proposal reviewer for overseas bodies including FCT (Portuguese scientific research council) and the Hungarian National Research, Development and Innovation Office (NKFIH).

- Regular article reviewer for *Mathematical Reviews* and *MathSciNet*.

- Regular referee for numerous journals and conferences in mathematics and computer science.

Event Organisation

- 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, July 2013 and November 2015.

- Co-organised the *First CoDiMa Training School on Computational Discrete Mathematics* (Manchester, November 2015).

- Local organising committee member (responsible for website and publicity) for *Logic Colloquium 2012* (Manchester, July 2012).

- Scientific committee member for the *83rd Arbeitstagung Allgemeine Algebra* (Novi Sad, March 2012).

- Co-organised workshop on *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).

- 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).

External Examining

- Undergraduate External Examiner for the University of Hull (2014–)

Administrative Service within Manchester

- Head of Pure Mathematics (2015–)

- Member of School of Mathematics Athena Swan Committee (2015–)

- Panel member for inaugural Turing Fellowship appointments (2015)

- Mathematics Programme Director for Computer Science and Mathematics joint honours degree programme (2013–2015).

- Member of School of Mathematics Research Committee (2010–2014).

- Member of School of Mathematics Research Funding Allocation Committee (2010–).

- Member of Mathematics Undergraduate Curriculum Review Group (2013–).

- Undergraduate Admissions Tutor (2011–2014).

- Organiser of Tropical Mathematics Seminar and Reading Group (2009–2013).

- Managed and served on panel for recruitment of new Lecturer in Pure Mathematics (2012).

Selected Training and Professional Development

- University of Manchester *HEADSTART: Preparing for University Senior Leadership* (2015).

- 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 (2008–) and Fellow (2015–) of the *Institute of Mathematics and its Applications*.

- Member of the *London Mathematical Society* (2001–). Served on the *Society Lectures and Meetings Committee* (2017–).

- Fellow of the *Higher Education Academy* (2017–).

- Manchester representative for the *British Combinatorial Bulletin* (2008–2012).

Outreach Work

- Part of team representing the School of Mathematics at the Big Bang Science Fair, Birmingham, 2015.

- 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–).

- 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.