Dr Anthony Henderson FAustMS
Email: anthony.henderson@sydney.edu.au

Employment History

- Jul 2022 – : Defence Science and Technology Group, Department of Defence.
  [Jul '22 – : Honorary Professor, University of Sydney]
- Jan 2016 – Jun 2022: Professor of Mathematics, University of Sydney.
  [Jul '18 – Dec '21: Executive Director, Sydney Mathematical Research Institute; Jan–Dec '18: Deputy Head, School of Mathematics and Statistics]
- Jan 2012 – Dec 2015: Associate Professor and ARC Future Fellow, University of Sydney. [Jul–Dec '12, Jan–Apr '14, Jul–Sep '15: Visiting Fellow, Australian National University]
- Jan 2009 – Dec 2011: Senior Lecturer, University of Sydney.
  [Jan–Jun '10: Senior Research Associate, University of Sydney]
- Jan 2007 – Dec 2008: Lecturer, University of Sydney.
- Jul 2001 – Dec 2006: Postdoctoral Research Fellow, University of Sydney.

Degrees

- PhD in Mathematics, MIT, June 2001, supervised by G. Lusztig.
- BSc with First Class Honours and University Medal in Pure Mathematics, University of Sydney, 1996, supervised by G. I. Lehrer.

Selected Awards and Grants

- Discovery Projects grant (joint with P. N. Achar), Australian Research Council, 2017–21.
- Discovery Projects grant (joint with G. I. Lehrer and G. Williamson), ARC, 2016–22.
- Australian Mathematical Society Medal, 2012 (joint winner - for distinguished research by a member under 40), and Fellowship of the Society.
- Future Fellowship, ARC, 2012–15.
- Christopher Heyde Medal of the Australian Academy of Science, 2011 (for outstanding pure mathematics researcher under 40 in Australia).
- Faculty of Science Citation for Excellence in Teaching, 2009.
- Discovery Projects grant (joint with A. Mathas), ARC, 2009–13.
- Discovery Projects grant, ARC, 2009–10.
- Postdoctoral Fellowship and Discovery Projects grant, ARC, 2003–06.

Leadership and Engagement

School of Mathematics and Statistics, University of Sydney

- Executive Director, Sydney Mathematical Research Institute, 2018–21.
- Deputy Head of School, 2018.
- Acting head of Pure Mathematics research group, Semester 2, 2017.
- Prizes Coordinator, 2011–18.
- School's representative on Faculty of Science Undergraduate Studies Committee, 2008–11.
- Organizer, Algebra Seminar, 2003–08.

Australian Academy of Science (AAS)

- Deputy Chair, National Committee for Mathematical Sciences, 2020–21.
- Member of steering committee, Decadal Plan for the Mathematical Sciences in Australia, 2012–15.
- Early/Mid-Career Researcher Observer, National Committee for Mathematical Sciences, 2012–13.

Australian Mathematical Sciences Institute (AMSI)

- Director, AMSI Summer School 2017.
- Member of AMSI Research and Higher Education committee, 2016–18.
- Member of AMSI Advanced Collaborative Environment standing committee, 2017–18.

Australian Mathematical Society (AustMS)

- Elected Vice-President of AustMS, 2013–15.
- Member of AustMS Council, 2009–11.
- Member of prize committee, AustMS Medal, 2017 and 2020–22 (Chair in 2021).
- Member of prize committee, Gavin Brown Prize, 2011.
- Co-organizer, AustMS Early Career Workshop, 2009–10.

Mathematics competitions

- Director, Simon Marais Mathematics Competition Ltd, 2016 – present.
- Organizer, Sydney University Mathematics Society Problem Competition, 2006–15.

Conferences

- Honoree of 'Hendoff' workshop, USyd, April 2022.
- Member of organizing committee, 'Birational Geometry and Moduli Spaces' workshop, USyd, Dec 2019.
- Chair of organizing committee, 'Future Directions in Representation Theory' conference, USyd, Dec 2017.
- Organizer, Representation Theory Special Session, AustMS Annual Meeting, 2014–15.
- Member of organizing committee, 'Geometry and Lie Theory' conference, ANU/USyd, July 2007.
- Member of local committee, 'Geometric Aspects of Representation Theory' conference, USyd, July 2002.

Journals

- Associate Editor, *Journal of the Australian Math. Soc.*, 2012–21.
- Referee for *Advances in Mathematics*, *Compositio Mathematica*, *Duke Mathematical J.*, *Indagationes Mathematicae*, *American J. of Mathematics*, *J. of Combinatorial Theory Series A*, *J. of Algebra*, *Representation Theory*, *Transformation Groups*, *J. of Lie Theory*, *Selecta Mathematica*, *International Mathematical Research Notices*, *Mathematische Zeitschrift*, *Mathematical Research Letters*, *Pacific J. of Mathematics*, *Electronic J. of Combinatorics*, *Mathematics of Computation*, *J. of the European Math. Soc.*, *J. of the London Math. Soc.*, *Bull. of the London Math. Soc.*, *J. of the Math. Soc. of Japan*, *Science China Math.*, *Bull. of the Iranian Math. Soc.*, *J. of the Australian Math. Soc.*, *Bull. of the Australian Math. Soc.*, *Australasian J. of Combinatorics*, proceedings.
- Reviewer, *Mathematical Reviews*, 2006–21 (123 reviews).

Research Publications (co-authors always in alphabetical order)

[**34**] T. Gobet, A. Henderson and I. Marin, 'Braid groups of normalizers of reflection subgroups', *Annales de l'Institut Fourier* **71** (2021), no. 6, 2273–2304.

[**33**] P. N. Achar, A. Henderson, D. Juteau and S. Riche, 'Modular generalized Springer correspondence: an overview', *Advanced Lectures in Mathematics*, no. 45, International Press, Boston, 2019, 77–99.

[**32**] A. Henderson, 'Involutions on the affine Grassmannian and moduli spaces of principal bundles', *Bulletin of the Institute of Mathematics, Academia Sinica* **13** (2018), no. 1, 43–97.

[**31**] P. N. Achar, A. Henderson, D. Juteau and S. Riche, 'Modular generalized Springer correspondence III: exceptional groups', *Mathematische Annalen* **369** (2017), no. 1–2, 247–300.

[**30**] P. N. Achar, A. Henderson, D. Juteau and S. Riche, 'Modular generalized Springer correspondence II: classical groups', *Journal of the European Mathematical Society (JEMS)* **19** (2017), no. 4, 1013–1070.

[**29**] P. N. Achar, A. Henderson, D. Juteau and S. Riche, 'Constructible sheaves on nilpotent cones in rather good characteristic', *Selecta Mathematica* **23** (2017), no. 1, 203–243.

[**28**] P. N. Achar, A. Henderson, D. Juteau and S. Riche, 'Modular generalized Springer correspondence I: the general linear group', *Journal of the European Mathematical Society (JEMS)* **18** (2016), no. 7, 1405–1436.

[**27**] A. Henderson, 'Singularities of nilpotent orbit closures', *Revue Roumaine de Mathématiques Pures et Appliquées* **60** (2015), no. 4, 441–469.

[**26**] P. N. Achar, A. Henderson and S. Riche, 'Geometric Satake, Springer correspondence, and small representations II', *Rep. Theory* **19** (2015), 94–166.

[**25**] A. Henderson and A. Licata, 'Diagram automorphisms of quiver varieties', *Advances in Mathematics* **267** (2014), 225–276.

[**24**] P. N. Achar, A. Henderson, D. Juteau and S. Riche, 'Weyl group actions on the Springer sheaf', *Proc. London Math. Soc.* **108** (2014), no. 6, 1501–1528.

[**23**] P. N. Achar and A. Henderson, 'Geometric Satake, Springer correspondence, and small representations', *Selecta Mathematica* **19** (2013), no. 4, 949–986.

[**22**] A. Henderson, 'Rational cohomology of the real Coxeter toric variety of type A', in 'Configuration Spaces: Geometry, Combinatorics, and Topology', *Publications of the Scuola Normale Superiore*, no. 14, Pisa, 2012, 313–326.

[**21**] A. Henderson and P. E. Trapa, 'The exotic Robinson–Schensted correspondence', *Journal of Algebra* **370** (2012), 32–45.

[**20**] A. Henderson and M. L. Wachs, 'Unimodality of Eulerian quasisymmetric functions', *Journal of Combinatorial Theory A* **119** (2012), no. 1, 135–145.

[19] A. Henderson, 'Enhancing the Jordan canonical form', *Australian Mathematical Society Gazette* **38** (2011), no. 4, 206–211.

[18] P. N. Achar, A. Henderson and B. F. Jones, 'Normality of orbit closures in the enhanced nilpotent cone', *Nagoya Math. Journal* **203** (2011), 1–45.

[17] P. N. Achar, A. Henderson and E. Sommers, 'Pieces of nilpotent cones for classical groups', *Rep. Theory* **15** (2011), 584–616.

[16] A. Henderson, 'Exterior powers of the reflection representation in the cohomology of Springer fibres', *C. R. Math.* **348** (2010), no. 19–20, 1055–1058.

[15] A. Henderson and G. I. Lehrer, 'The equivariant Euler characteristic of real Coxeter toric varieties', *Bull. London Math. Soc.* **41** (2009), no. 3, 515–523.

[14] P. N. Achar and A. Henderson, 'Orbit closures in the enhanced nilpotent cone', *Advances in Mathematics* **219** (2008), no. 1, 27–62.

[13] A. Henderson, 'The symmetric group representation on cohomology of the regular elements of a maximal torus of the special linear group', *Journal of the Australian Mathematical Society* **84** (2008), no. 1, 85–98.

[12] A. Henderson and E. Rains, 'The cohomology of real De Concini-Procesi models of Coxeter type', *Int. Math. Res. Not.* **2008** (2008), no. 7, rnn001.

[11] A. Henderson, 'Nilpotent orbits of linear and cyclic quivers and Kazhdan-Lusztig polynomials of type A', *Rep. Theory* **11** (2007), 95–121.

[10] A. Henderson, 'Induced characters of the projective general linear group over a finite field', *Journal of Algebra* **307** (2007), no. 1, 116–135.

[9] A. Henderson, 'Plethysm for wreath products and homology of sub-posets of Dowling lattices', *Electronic J. of Combinatorics* **13** (2006), no. 1, 25 pp.

[8] A. Henderson, 'Bases for certain cohomology representations of the symmetric group', *Journal of Algebraic Combinatorics* **24** (2006), no. 4, 361–390.

[7] A. Henderson, 'Species over a finite field', *Journal of Algebraic Combinatorics* **21** (2005), no. 2, 147–161.

[6] A. Henderson, 'Representations of wreath products on the cohomology of De Concini–Procesi compactifications', *IMRN* (2004), no. 20, 983–1021.

[5] A. Henderson, 'Symmetric subgroup invariants in irreducible representations of G^F, when $G = GL_n$', *Journal of Algebra* **261** (2003), no. 1, 102–144.

[4] A. Henderson, 'Two-row nilpotent orbits of cyclic quivers', *Mathematische Zeitschrift* **243** (2003), 127–143.

[3] A. Henderson, 'Spherical functions of the symmetric space $G(\mathbb{F}_{q^2})/G(\mathbb{F}_q)$', *Rep. Theory* **5** (2001), 581–614.

[2] A. Henderson, 'Fourier transform, parabolic induction, and nilpotent orbits', *Transformation Groups* **6** (2001), 353–370.

[1] A. Henderson, 'Character sheaves on symmetric spaces', PhD thesis, 2001.

Invited Conference Presentations

[35] Conference on Hyperplane Arrangements and Singularities, Tokyo, Dec 19.

[34] Workshop on Algebraic Groups, Oberwolfach, Apr 17.

[33] Conference on Nilpotent Orbits, Pisa, Jun 16.

[32] 5th Taipei Conference in Representation Theory, Taipei, Jan 16.

[31] Conference on Geometric and Categorical Rep Theory, Mooloolaba, Dec 15.

[30] Workshop on Geometric Quantization, Adelaide, Jul 15.

[29] Workshop on Geometric Representation Theory, Oberwolfach, May 15.

[28] **Mini-course**, Winter School on Representation Theory, Research Institute for the Mathematical Sciences, Kyoto, Jan 15.

[27] Workshop on Algebraic Groups and Representations, Tsinghua Sanya Int'l Math. Forum, Dec 14.

[26] Workshop on Algebra and Topology, ANU Kioloa Campus, Nov 14.

[25] Conference on Algebraic Groups and Representations, Lyon, Jul 14.

[24] Conference on Representation Theory in Geometry, Topology and Combinatorics, Melbourne, Nov 13.

[23] **Opening plenary**, AustMS Annual Meeting, Sydney, Sep 13.

[22] **Mini-course**, Jap.-Aust. Workshop on Singularities, Sydney, Sep 13.

[21] Pacific Rim Mathematical Association Congress, Shanghai, Jun 13.

[20] Workshop on Algebraic Geometry and Related Fields, Canberra, May 13.

[19] Workshop on Algebraic Groups, Oberwolfach, Apr 13.

[18] Workshop on Geometry of Nilpotent Orbits, Poitiers, Apr 13.

[17] Workshop on Algebra, Caen, Mar 13.

[16] Conference on Algebraic Groups and Rep Thy, Hong Kong, Jan 13.

[15] AMSI Workshop on Symmetry, Wollongong, Feb 12.

[14] Workshop on Weyl Groups and Root Systems, Tokyo, Sep 11.

[13] Conference on Algebraic Cycles and Orbit Spaces, Canberra, Sep 11.

[12] Workshop on Combinatorial Representation Theory, Melbourne, Jan 11.

[11] Workshop on Algebra and Geometry of Configuration Spaces, Pisa, Jun 10.

[10] Workshop on Combinatorial Representation Theory, Oberwolfach, Mar 10.

[9] Jap.-Aust. Workshop on Singularities, Sydney, Sep 09.

[8] Conference on Shuffles, Descents, and Representations, Nice, Sep 07.

[7] BIRS Workshop on Algebraic Lie Theory, Banff, May 07.

[6] Conference on Braids and their Ramifications, Cortona, May 07.

[5] AMSI Workshop on Lie Theory, Newcastle, Nov 05.

[4] Mathematical Physics and Lie Theory, Coolangatta, Dec 04.

[3] Lie Minisymposium, Sydney, Nov 03.

[2] Workshop on Representation Theory, Canberra, Jul 03.

[1] Australasian Research Symposium on Groups and Representations, Auckland, Dec 01.

Seminars and Colloquia (not including those at USyd)

- University of Auckland Maths Colloquium and Seminar, May 19.
- Macquarie University Maths Colloquium, May 18; Cat Thy Sem, Oct 17.
- Australian National University Algebra Seminar, Sep 17, Mar 14, Aug 12, Jul 12, Aug 09, Nov 07, Nov 05, Sep 02; Mathematics Colloquium, Oct 05.
- University of Melbourne Pure Maths Seminar, Sep 17, Jul 13.
- **Seminar Series**, POSTECH Center for Geometry, Pohang, Jan–Feb 15.
- University of Kyoto Representation Theory Seminar, Jan 15.
- University of Western Sydney Mathematics Colloquium, Aug 13.
- Universität Bonn Representation Theory Seminar, Apr 13.
- Université de Clermont–Ferrand II Colloquium, Apr 13.
- University of Adelaide Geometry Seminar and Colloquium, Jun 12.
- University of Queensland Mathematics Colloquium, May 11.
- Séminaire Chevalley, Paris, Jun 10.
- Université de Caen Algebra Seminar, Jun 10.
- London Algebra Colloquium, Mar 10.
- University of Utah Representation Thy Seminar and Colloquium, Nov 09.
- University of Iowa Algebra Seminar, Nov 09.
- University of North Carolina Representation Theory Seminar, Nov 09.
- Louisiana State University Algebra Seminar, Oct 09.
- Algebraic Lie Theory Seminar, Isaac Newton Institute, Cambridge, Jun 09.
- University of New South Wales Pure Maths Sem, Aug 06, Aug 05, May 03.
- Massachusetts Institute of Technology Lie Groups Sem, Nov 00.

Postdoctoral Supervision

- Anna Romanov, Research Associate (ARC-supported), Nov 20 – Sep 21.
- Thomas Gobet, Research Associate (ARC-supported), Jan 18 – Aug 19.
- Ulrich Thiel, Research Fellow (ARC-supported), Apr 17 – Mar 19.
- Alan Stapledon, USyd Postdoctoral Fellow, Jul 13 – Mar 15.

Postgraduate Supervision (for whole of complete candidature)

- Mengfan Lyu, PhD, auxiliary supervisor, approved Apr 22.
- Kane Townsend, PhD, primary supervisor, approved Mar 22.
- Joel Gibson, PhD, auxiliary supervisor, approved Sep 20.
- Joseph Baine, MPhil, auxiliary supervisor, approved Mar 20.
- Alexander Kerschl, PhD, auxiliary supervisor, approved Jul 19.
- Michael Hendriksen, MSc, associate supervisor, approved Jan 16.
- Clinton Boys, PhD, associate supervisor, approved Feb 15.
- Natalie Aisbett, PhD, primary supervisor, approved Jun 13.
- Graham White, MSc, associate supervisor, approved May 13.
- Ge Li, PhD, associate supervisor, approved Dec 12.
- Justin Koonin, PhD, associate supervisor, approved Mar 12.
- Neil Saunders, PhD, associate supervisor, approved Feb 11.
- Michael Sun, MSc, primary supervisor, approved Jan 10.

Honours Supervision

- Hazel Browne, 2019 (First Class Honours and University Medal).
- Alexander Ecob, 2019 (First Class Honours).
- Edwin Spark, 2016 (First Class Honours and University Medal).
- Kane Townsend, 2016 (First Class Honours).
- Christopher Ryba, 2014 (First Class Honours and University Medal).
- Noah White, 2011 (First Class Honours).
- Clinton Boys, 2010 (First Class Honours).
- Vinoth Nandakumar, 2010 (First Class Honours and University Medal).
- Michael Sun, 2008 (First Class Honours and University Medal).
- Fan Wu, 2008 (First Class Honours).
- Alex Fun, 2007 (First Class Honours).

Undergraduate Textbook

- A. Henderson, 'Representations of Lie Algebras: An Introduction Through $\mathfrak{gl}_n$', *Australian Mathematical Society Lecture Series*, no. 22, Cambridge University Press, Cambridge, 2012.

Courses Lectured (at USyd unless specified)

- First year: Differential Calculus, 2007–08, 2018; Linear Algebra, 2016.
- Second year: Discrete Mathematics and Graph Theory, 2007–09; Algebra (Advanced), 2011, 2017; Number Theory and Cryptography, 2016; Special Studies Program, 2011, 2013.
- Third year: Rings and Fields, 2003–04; Modules and Group Representations (Advanced), 2006–10.
- Honours: Lie Algebras, 2002, 2005, 2011, 2014, and also in the Australian Mathematical Sciences Institute Summer School, 2004 and 2007; Representation Theory, 2016–18.
- Postgraduate: Geometric Representation Theory, AMSI Winter School, 2015.