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Scott Morrison - Resume

I am a mathematician interested in higher dimensional categories, topological field theories, operator algebras (particularly subfactors), and connections with topological quantum computing. I am especially excited about exotic examples of higher categorical structures.

Employment

Associate Professor

January 2016-present, in the Mathematical Sciences Institute at the Australian National University.

Senior Lecturer

July 2012-December 2015, MSI.

DECRA Research Fellow, the Australian National University

July 2012-June 2015. Supported by the ARC grant *Fusion categories and topological quantum field theory*.

Miller Fellowship, UC Berkeley.

July 2009-June 2012. I was a Fellow of the interdisciplinary [Miller Institute for Basic Research](#) at UC Berkeley, hosted in the mathematics department.

Post-doctoral research, Microsoft Station Q.

April 2007-June 2009.

Prizes

- The Medal of the Australian Mathematical Society, 2015.
- The Christopher Heyde Medal for Research in Pure Mathematics, 2015.

Education

University of California, Berkeley, Doctor of Philosophy (Mathematics).

2001-2007. Worked with [Prof. Vaughan Jones](#). Received the 2007 Herbert Alexander Prize for Outstanding Dissertation in Pure Mathematics and a 2004 Outstanding Graduate Student Instructor Award.

University of New South Wales, Bachelor of Science (Hons.)

1998-2001, Sydney, Australia. First class honours in Mathematics, and the University Medal.

Publications

Published

The centre of the extended Haagerup subfactor has 22 simple objects.

with Kevin Walker. In press at the *International Journal of Mathematics*, accepted 26 Dec 2016. [arXiv:1404.3955](#).

Categories generated by a trivalent vertex.

with Emily Peters and Noah Snyder. *Selecta Mathematica* 2016. DOI:10.1007/s00029-016-0240-3 [arXiv:1501.06869](#).

2-supertransitive subfactors at index $3 + \sqrt{5}$.

with David Penneys. *Journal of Functional Analysis*, 269 (2015), pp. 2845-2870. DOI:10.1016/j.jfa.2015.06.023 [arXiv:1406.3401](#).

Quotients of $A_2 * T_2$

with Masaki Izumi and David Penneys. In press at *Canadian Journal of Mathematics*, accepted March 19 2015. DOI:10.4153/CJM-2015-017-4 [arXiv:1308.5723](#).

Subfactors of index exactly 5.

with Masaki Izumi, David Penneys, Emily Peters, and Noah Snyder. *Bulletin of the London Mathematical Society*, (2015) 47 (2), pp. 257-269. DOI:10.1112/blms/bdu113 [arXiv:1406.2389](#).

Constructing spoke subfactors using the jellyfish algorithm

with David Penneys, *Transactions of the American Mathematical Society*, vol. 367, no. 5 (2015). DOI:10.1090/S0002-9947-2014-06109-6 [arXiv:1208.3637](#)

1-supertransitive subfactors with index at most $6\frac{1}{5}$

with Zhengwei Liu and David Penneys. *Communications in Mathematical Physics*, vol. 334, issue 2 (2015), pp 889-922. DOI:10.1007/s00220-014-2160-4 [arXiv:1310.8566](#).

An obstruction to subfactor principal graphs from the graph planar algebra embedding theorem. *Bulletin of the London Mathematical Society*, vol. 46 (2014). DOI:10.1112/blms/bdu009 [arXiv:1302.5148](#).

The little desert? Some subfactors with index in the interval $(5, 3 + \sqrt{5})$

with Emily Peters, *International Journal of Mathematics*, vol. 25, issue 8 (2014). [arXiv:1205.2742](#) DOI:10.1142/S0129167X14500803.

The classification of subfactors of index at most 5

with Vaughan F.R. Jones and Noah Snyder. *Bulletin of the American Mathematical Society* 51 (2014), no. 2, 277-327. [arXiv:1304.6141](#).

Webs and quantum skew Howe duality

with Sabin Cautis and Joel Kamnitzer, accepted at *Math. Ann.*, October 21 2013. [arXiv:1210.6437](#).

Subfactors of index less than 5, part 3: quadruple points

with Masaki Izumi, Vaughan F.R. Jones and Noah Snyder. *Communications in Mathematical Physics*, vol. 316, issue 2 (2012). DOI:10.1007/s00220-012-1472-5 [arXiv:1109.3190](#).

The blob complex

with Kevin Walker. *Geometry & Topology* 16 (2012) 1481-1607. DOI:10.2140/gt.2012.16.1481 [arXiv:1009.5025](#).

Subfactors of index less than 5, part 2: triple points

with David Penneys, Emily Peters and Noah Snyder. *International Journal of Mathematics* vol. 23, no. 3 (2012) 1250016 (33 pages). DOI:10.1142/S0129167X11007586 [arXiv:1007.2240](#).

Subfactors of index less than 5, part 1: the principal graph odometer

with Noah Snyder. *Communications in Mathematical Physics*, vol. 312, issue 1 (2012), pp. 1-35.

[DOI:10.1007/s00220-012-1426-y](https://doi.org/10.1007/s00220-012-1426-y) [arXiv:1007.1730](https://arxiv.org/abs/1007.1730).

Non-cyclotomic fusion categories

with Noah Snyder, *Transactions of the American Mathematical Society*, vol. 364 (2012), no. 9, pp. 4713–4733. [arXiv:1002.0168](https://arxiv.org/abs/1002.0168).

Constructing the extended Haagerup planar algebra

with Stephen Bigelow, Emily Peters and Noah Snyder. *Acta Mathematica*, vol. 209 (2012) pp. 29–82. [DOI:10.1007/s11511-012-0081-7](https://doi.org/10.1007/s11511-012-0081-7) [arXiv:0909.4099](https://arxiv.org/abs/0909.4099).

Higher categories, colimits and the blob complex

with Kevin Walker. *Proceedings of the National Academy of Sciences* May 17, 2011 vol. 108 no. 20 pp. 8139–8145. [DOI:10.1073/pnas.1018168108](https://doi.org/10.1073/pnas.1018168108) [arXiv:1108.5386](https://arxiv.org/abs/1108.5386).

Cyclotomic integers, fusion categories, and subfactors

with Frank Calegari and Noah Snyder, with an appendix by Victor Ostrik, *Communications in Mathematical Physics* vol. 303, issue 3 (2011), pp. 845–896. [DOI:10.1007/s00220-010-1136-2](https://doi.org/10.1007/s00220-010-1136-2) [arXiv:1004.0665](https://arxiv.org/abs/1004.0665).

Knot polynomial identities and quantum group coincidences

with Emily Peters and Noah Snyder, *Quantum Topology* vol. 2 (2011) pp. 101–156. [DOI:10.4171/QT/16](https://doi.org/10.4171/QT/16) [arXiv:1003.0022](https://arxiv.org/abs/1003.0022).

The braid group surjects onto G_2 tensor space

Pacific Journal of Mathematics, vol. 249 (2011), no. 1, pp. 189–198. [DOI:10.2140/pjm.2011.249.189](https://doi.org/10.2140/pjm.2011.249.189) [arXiv:0907.0256](https://arxiv.org/abs/0907.0256).

Man and machine thinking about the smooth 4-dimensional Poincaré conjecture

with Michael Freedman, Robert Gompf and Kevin Walker, *Quantum Topology*, vol. 1, issue 2 (2010), pp. 171–208. [DOI:10.4171/QT/5](https://doi.org/10.4171/QT/5) [arXiv:0906.5177](https://arxiv.org/abs/0906.5177).

Skein theory for the D_{2n} planar algebras

with Emily Peters and Noah Snyder, *Journal of Pure and Applied Algebra* vol. 214, no. 2 (2010) pp. 117–139. [DOI:10.1016/j.jpaa.2009.04.010](https://doi.org/10.1016/j.jpaa.2009.04.010) [arXiv:0808.0764](https://arxiv.org/abs/0808.0764).

A Diagrammatic Category for the Representation Theory of $U_q(\mathfrak{sl}_n)$

Ph.D. thesis. [arXiv:0704.1503](https://arxiv.org/abs/0704.1503).

Fixing the functoriality of Khovanov homology

with David Clark and Kevin Walker, *Geometry and Topology* vol. 13 (2009) pp. 1499–1582. [DOI:10.2140/gt.2009.13.1499](https://doi.org/10.2140/gt.2009.13.1499) [arXiv:math.GT/0701339](https://arxiv.org/abs/math.GT/0701339).

On Khovanov’s cobordism theory for \mathfrak{su}_3 knot homology

with Ari Nieh, *Journal of Knot Theory and its Ramifications* vol. 17, no. 9 (2008). [arXiv:math.GT/0612754](https://arxiv.org/abs/math.GT/0612754) [DOI:10.1142/S0218216508006555](https://doi.org/10.1142/S0218216508006555).

The Karoubi Envelope and Lee’s Degeneration of Khovanov Homology

with Dror Bar-Natan, *Algebraic & Geometric Topology* vol. 6 (2006) pp. 1459–1469. [arXiv:math.GT/0606542](https://arxiv.org/abs/math.GT/0606542) [DOI:10.2140/agt.2006.6.1459](https://doi.org/10.2140/agt.2006.6.1459).

Preprints in peer review

Modular data for the extended Haagerup subfactor.

with Terry Gannon. [arXiv:1606.07165](https://arxiv.org/abs/1606.07165)

The classification of subfactors with index at most $5\frac{1}{4}$.

with Narjess Afzaly and David Penneys. [arXiv:1509.00038](https://arxiv.org/abs/1509.00038).

Computing annular Khovanov homology.

with Hilary Hunt, Hannah Keese, and Anthony Licata. [arXiv:1505.04484](https://arxiv.org/abs/1505.04484).

Outreach

I am a co-founder and moderator of [MathOverflow](#), a website for mathematicians to ask and answer research-level questions. MathOverflow was established in 2009 and over 16,000 people have now asked a question. MathOverflow receives approximately 10,000 visits, and about 30 new questions each day. With Anton Geraschenko and Ravi Vakil, I wrote [an opinion piece about MathOverflow](#) for the June 2010 issue of the *Notices of the AMS*.

The visibility of MathOverflow makes the processes of mathematical research more accessible to the public. It is a fantastic tool for finding the relevant mathematical experts for deep technical questions. It is completely international, with active participants ranging from Fields Medallists to precocious undergraduates in countries without strong mathematical traditions. *MathOverflow* has helped create many new collaborations. There are [over 900 pre-prints](#) posted on the arXiv which cite or acknowledge MathOverflow.

I am a member of the group blog the *Secret Blogging Seminar*: a group of Berkeley Ph. D. graduates discuss research mathematics and events important to mathematicians. As an example, [my post](#) there germinated the massively collaborative ‘Polymath 8’ project, improving the bounds on gaps between prime numbers.

My research and outreach activities have appeared in the science and general media, including

[165-year-old math problem on verge of solution](#)

Shubashree Desikan, *The Hindu*, 9 April 2014

[Sudden Progress on Prime Number Problem Has Mathematicians Buzzing](#)

Erica Klarreich, *Wired Magazine*, 22 November 2013

[Game of proofs boosts prime pair result by millions](#)

Jacob Aron, *New Scientist*, 5 June 2013

[Cracking Open the Scientific Process](#)

Thomas Lin, *New York Times*, 16 Jan 2012

[The Global Math Commons](#)

Erica Klarreich, *Simons Foundation newsletter*, 18 May 2011

[Stanford and UC Berkeley create massively collaborative math](#)

Lisa Krieger, *San Jose Mercury News*, 8 August 2010

Service

I am a member of the mathematics advisory board for the arXiv (the main preprint server for mathematics and physics), as well as a subject area moderator for quantum algebra. I am a founding board member of MathOverflow, the premier online site for research level mathematics questions and answers. I was on the 2013-2015 Council of the Australian Mathematical Society,

Internally, I am the HDR convenor within the Mathematical Sciences Institute, and a member of the MSI IT committee.

Grants

The [research](#) page of my website contains more details on these grants, including application materials and assessments.

Low-dimensional categories

An ARC ‘Discovery Project’ for 2016-2018 (\$455,000). (postdoc and travel funding)

Symmetries of subfactors

An ARC ‘Discovery Project’ for 2014-2016 (\$375,000), jointly held with Pinhas Grossman and Vaughan Jones. (postdoc and travel funding)

Fusion categories and topological quantum field theory

An ARC ‘Discovery Early Career Research Award’ for 2012-2014 (\$360,000).

Quantum symmetries

A DARPA grant for 2012-2014, jointly held with Dietmar Bisch, Vaughan Jones, and Dmitri Shlyakhtenko (USD488,058). (travel and conference funding)

MathOverflow development

A Sloan Foundation grant (USD8,000) to support setting up MathOverflow Inc., and software development for MathOverflow.

Conferences

MSRI (Berkeley) semester program on Quantum Symmetries

Co-organizer with Victor Ostrik, Emily Peters, Eric Rowell, and Noah Snyder. Spring 2020.

Proposal in preparation: Banff workshop on Subfactors and fusion categories

Co-written with Terry Gannon, David Penneys, and Julia Plavnik. For 2018.

Proposed: Oberwolfach workshop on Subfactors and conformal field theory

Co-written with Dietmar Bisch, Terry Gannon, and Emily Peters. For 2018.

Banff workshop on Subfactors and Fusion Categories

Co-organizer with Vaughan Jones, David Penneys, Emily Peters, and Noah Snyder . April 2014.

AIM workshop on Fusion Categories

Co-organizer with Eric Rowell and Noah Snyder. March 2012.

Subfactors in Maui

Co-organizer of [Subfactors in Maui 2014](#) (funded by the NSF), [Subfactors in Maui 2011](#) (funded by DARPA), and [Subfactors in Maui 2007](#).

Quantum Topology in Wellington

With David Gauld, [Quantum Topology](#) at the joint NZMS/AMS meeting in New Zealand, 2007.

For a complete list of my invited conference talks, please see [my webpage](#).

Refereeing

I have refereed for many top mathematics journals, including *Algebraic and Geometric Topology*, *Communications in Mathematical Physics*, the *Duke Mathematical Journal*, *Geometry & Topology*, *International Mathematics Research Notices*, the *Journal of Functional Analysis*, the *Proceedings of the American Mathematical Society*, and *Quantum Topology*.