PROFESSOR STEPHEN BARTLETT
School of Physics | Faculty of Science

Stephen D. Bartlett

Professor in Physics

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Citizenships:	Australian and Canadian

Summary

I am a theoretical quantum physicist and Professor in the School of Physics. I lead a team pursuing both fundamental and applied research in quantum information theory, including the theory of quantum computing. I am a Chief Investigator in the Australian Research Council Centre of Excellence in Engineered Quantum Systems (EQUS), heading a program on Designer Quantum Materials. I am the inaugural Lead Editor of the APS journal *PRX Quantum*. I am a Fellow of the American Physical Society (APS), the Australian Institute of Physics (AIP), and the Royal Society of NSW.

I am the Associate Dean Research for the Faculty of Science. I sit on the Executive Board of the Sydney Quantum Academy, on the Quantum Expert Advisory Board of the new quantum computing initiative at Transport for NSW, and on the International Scientific Advisory Board of the Stewart Blusson Quantum Matter Initiative at UBC.

Academic appointments

Professor, The University of Sydney, Jan 2012 –

Associate Dean Research, Faculty of Science, The University of Sydney, 2020-2023
Lead Editor, APS journal *PRX Quantum*, 2020-2026

Visiting Researcher, Perimeter Institute for Theoretical Physics, Aug – Dec 2009

Associate Professor, The University of Sydney, Jan 2010 – Dec 2011
Senior Lecturer, The University of Sydney, Jan 2008 – Dec 2009
Lecturer, The University of Sydney, Jan 2005 – Dec 2007

Lecturer (fixed-term), The University of Queensland, Jan 2004 – Jan 2005
ARC Postdoctoral Research Fellow, University of Queensland, Jul 2003 – Dec 2003
ARC Postdoctoral Research Fellow, Macquarie University, Jan 2003 – Jul 2003
Macquarie University Research Fellow, Macquarie University, Jan 2001 – Jan 2003
Promoted to *Level B: Lecturer* effective 1/1/2003
Research Associate, Macquarie University, Jul 2000 – Jan 2001

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Education

Doctor of Philosophy in Physics, University of Toronto, 2000
Thesis: *Quantization of a Classical Model with Symmetry*
Supervisor: Prof David J Rowe

Master of Science in Physics, University of Toronto, 1996

Bachelor of Science in Physics and Mathematics, University of Waterloo, 1995

Graduate Certificate in Higher Education, University of Sydney, 2007.

Selected Awards and Fellowships

Fellow of the American Physical Society (APS)	2020
Fellow of the Royal Society of New South Wales	2020
SUPRA Supervisor of the Year Award	2017
Selby Research Award	2005
Australian Research Council Postdoctoral Fellowship	2003-2005
Macquarie University Research Fellowship	2001-2004

Senior Advisory Roles

Executive Board, Sydney Quantum Academy	2020-2023
Expert Advisory Panel, Transport for NSW Quantum program	2021-2024
College of Reviewers, Alliance Quantum program, Canada	2022-2025
Scientific Advisory Board, Steward Blusson Quantum Matter Institute, University of British Columbia, Canada	2021-2024
Scientific Advisory Board, Quantum Benchmark Inc	2018-2021

Research Grants

Summary

Over my career I have secured >20 major grants, many of which are large collaborative projects, with a combined research income exceeding $100 million (of which over $22 million has come to U. Sydney). Currently I manage a budget for my research group of over $1 million p.a. in external funding.

Successful Competitive Research Grants - External

Project Title	Investigators	Scheme	Value	Year
Driven qubit implementations in silicon-MOS devices	A Dzurak SD Bartlett + 6 additional PIs	U.S. ARO QS5	$ 464k Syd $ 7.1M total	2023-2026
Simulating and verifying quantum circuits	SD Bartlett R Raussendorf	ARC Discovery	$ 435 092	2022-2024
Hierarchical Quantum Estimation of Resources (HiQuER)	T Okhi SD Bartlett V Gheorghiu	DARPA Quantum Benchmarking	$ 750k Syd $ 4.1M total	2022-2025
Verification of Quantum Fault Tolerance (VEQTOR)	T Monz R Blatt SD Bartlett + 6 internat. PIs	U.S. ARO QCISS	$ 1.1M Syd $ 7.3M total	2020-2024
Multi-qubit operations using silicon-MOS quantum dots	A Dzurak A Morello SD Bartlett ST Flammia M Gyure	U.S. ARO Qubits in Silicon	$ 1.0M Syd $ 5.2M total	2017-2021

Symmetry and topology for robust quantum information	SD Bartlett AC Doherty	ARC Discovery	$ 285 000	2017-2019
ARC Centre of Excellence for Engineered Quantum Systems	AG White SD Bartlett + 15 Aust. CIs + 16 internat. PIs	ARC Centres of Excellence	$ 6.6M Syd $ 31.9M tot	2017-2024
Multi-qubit systems based on electron spins in coupled quantum dots	CM Marcus SD Bartlett in international team of 10 CIs	IARPA Multi-Qubit Coherent Operations Capstone Activity	$ 116k Syd $ 514k total	2015-2016
Photonic Quantum Characterization, Verification, and Validation	JL O'Brien SD Bartlett + 7 internat. PIs	U.S. ARO QCVV	$ 350k Syd $ 4.4M total	2014-2018
Bulk-boundary correspondence in quantum many-body systems	SD Bartlett AC Doherty	ARC Discovery	$ 270 000	2013-2015
ARC Centre of Excellence for Engineered Quantum Systems	GJ Milburn SD Bartlett + 15 Aust. CIs + 16 internat. PIs	ARC Centres of Excellence	$ 5.6M Syd $ 24.5M tot	2011-2017
NSW state government support - ARC Centre of Excellence for Engineered Quantum Systems	SD Bartlett, MJ Biercuk, AC Doherty, DJ Reilly, J Twamley (MQ)	NSW Science Leveraging Fund	$ 250k Syd $ 500k total	2011
Multi-qubit systems based on electron spins in coupled quantum dots	CM Marcus SD Bartlett in international team of 14 CIs	IARPA Multi-Qubit Coherent Operations	$ 4.2M Syd $ 27.5M tot	2010-2014
Quantum limits in measurement and communication *ranked A+ (top third of successful grants)*	GJ Pryde AC Doherty SD Bartlett HM Wiseman	ARC Discovery	$ 410 000	2009-2011
Quantum-enhanced reference systems *ranked A+ (top third of successful grants)*	SD Bartlett	ARC Discovery	$ 317 000	2008 2009 2010
Optical quantum computing	P Kwiat A Zeilinger AG White SD Bartlett ...	ARDA QCCM	$ 6.0M	2005-2008
Entanglement as resource for quantum technology	AC Doherty SD Bartlett	ARC Discovery	$ 300 000	2005-2007
Controlling quantum technologies	AG White SD Bartlett AC Doherty A Gilchrist JL O'Brien GJ Pryde	ARC Discovery	$ 660 000	2005-2007
Relative Quantum Information	SD Bartlett RW Spekkens DR Terno	ARC Linkage International – Awards	$ 30 500 + matching funds	2004-2006
Quantum Properties of Distributed Systems (QUPRODIS) – part of European Fifth Framework project	BC Sanders SD Bartlett D Berry	IAP – International S&T Competitive Grants	$ 45 000	2003-2005
Optical realisations of continuous-variable quantum information	SD Bartlett	ARC Discovery (inc. APD Fellowship)	$ 208 035	2003-2005

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Successful Competitive Research Grants - Internal

Project Title	Investigators	Scheme	Value	Year
Foundations of Quantum Computing	SD Bartlett R Harper ST Flammia	USyd Education Innovation Grant	$ 12 000	2019
New topological quantum physics on an integrated photonic chip	W Zhang X Jin SD Bartlett + 4 others	OGE Partnership Collaboration Awards - SJTU	$ 20 000	2019
Algebra and Topology in Quantum Nanoscience	SD Bartlett B Goldys + 7 others	AINST Accelerator	$ 70 000	2015
USyd-ICL collaboration on quantum computation in spin systems	SD Bartlett	International Program Development Fund	$ 10 000	2009
USyd International Visiting Research Fellowship for Prof J O'Brien	SD Bartlett JL O'Brien	USyd International Visiting Research Fellow	$ 11 500	2008
Quantum-enhanced Reference Systems	SD Bartlett	USydney Bridging Support	$ 70 000	2007
USyd Short-Term Visiting Fellowship for Dr T Rudolph	SD Bartlett T Rudolph	USyd Short-Term Visiting Fellowship	$ 9 000	2006
Quantum-enhanced Reference Systems	SD Bartlett	USydney R&D Grant-ECR	$ 23 000	2006
Reference Frames, Superselection Rules, and Quantum Information Theory	SD Bartlett	Selby Research Award	$ 6 500	2005
Sydney Quantum Info. Theory Workshop	SD Bartlett	Denison Small Grant	$ 9 000	2005
Creating new resources for optical quantum information processing	SD Bartlett	UQ New Staff Research Start-Up Fund	$ 11 950	2004
Discriminating photon detectors and applications to quantum computation	SD Bartlett	Macquarie University New Staff Scheme	$ 5 439	2002
Applications of Group Theory to Quantum Networks	SD Bartlett	Macquarie University Research Fellowship	$ 57 622 $ 57 622 $ 57 622	2001 2002 2003

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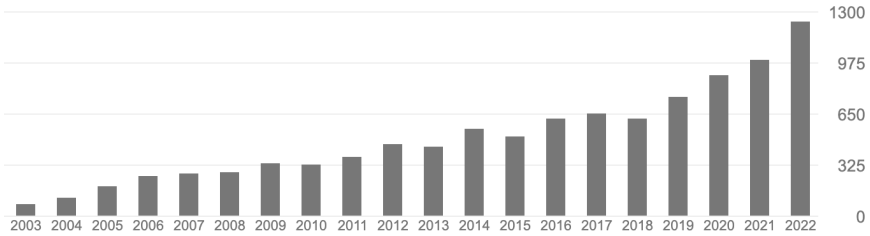
Research performance

Citation report



Total citations:	**10481**	as of 24 Apr 2023 [source: Google Scholar]
h-index:	**52**	(52 publications with at least 52 citations)
Field-weighted citation impact:	**2.1**	average for 5-year period 2018-2022

Most-cited publications

1. Stephen D. Bartlett, Terry Rudolph, and Robert W. Spekkens,
"Reference frames, superselection rules, and quantum information,"
Reviews of Modern Physics **79,** 555 (2007).
823 citations

2. B. L. Higgins, D. W. Berry, S. D. Bartlett, H. M. Wiseman, and G. J. Pryde,
"Entanglement-free Heisenberg-limited phase estimation,"
Nature **450,** 393 (2007).
637 citations

3. Marcus Cramer, Martin B Plenio, Steven T Flammia, David Gross, Stephen D Bartlett, Rolando Somma, Olivier Landon-Cardinal, Yi-Kai Liu, and David Poulin,
"Efficient quantum state tomography,"
Nature Communications **1**, 149 (2010).
526 citations

4. Nathan K. Langford, Rohan B. Dalton, Michael D. Harvey, Jeremy L. O'Brien, Geoff J. Pryde, Alexei Gilchrist, Stephen D. Bartlett, Andrew G. White,
"Entangled qutrits: production and characterisation,"
Physical Review Letters **93**, 053601 (2004).
428 citations

5. Stephen D. Bartlett, Barry C. Sanders, Samuel L. Braunstein, and Kae Nemoto,
"Efficient Classical Simulation of Continuous Variable Quantum Information,"
Physical Review Letters **88,** 097904 (2002).
415 citations

Invited expert commentary in *Nature* and *Science*

1. Andre Saraiva and Stephen D. Bartlett,
"The dawn of error correction with spin qubits," – News and Views
Nature Materials **22,** 157 (2023).
2. Stephen D. Bartlett,
"Programming a quantum phase of matter," – Perspectives
Science **374,** 1200 (2021).

3. Stephen D. Bartlett,
   "Atomic Physics: A milestone in quantum computing," – News and Views
   Nature **536,** 35 (2016).
4. Stephen D. Bartlett,
   "Quantum Metrology: The sensitive side of a spin," – News and Views
   Nature Nanotechnology **11,** 215 (2016).
5. Stephen D. Bartlett,
   "Quantum Computing: Powered by magic," – News and Views
   Nature **510,** 345 (2014).

Accepted talks at *Quantum Information Processing (QIP)* workshops

The QIP workshop is the premiere annual conference in quantum information theory. It is highly selective, with a talk acceptance rate of ~20%.

1. Pablo Bonilla Ataides, David Tuckett, Stephen Bartlett, Steve Flammia, Ben Brown,
   The XZZX surface code,
   Plenary, QIP 2021, Munich, Germany, 1-6/02/2021.
2. Hakop Pashayan, Oliver Reardon-Smith, Kamil Korzekwa, Stephen Bartlett,
   Fast estimation of outcome probabilities for quantum circuits,
   QIP 2021, Munich, Germany, 1-6/02/2021.
3. Stephen Bartlett, Sergey Bravyi, Benjamin Brown, Christopher Chubb, Andrew Darmawan, Steven Flammia, David Tuckett and Dominic Williamson
   High thresholds from symmetries of quantum codes,
   QIP 2020, Shenzhen, China, 6-10/01/2020.
4. Sam Roberts, Beni Yoshida, Aleksander Kubica, and Stephen D. Bartlett
   Symmetry protected topological order at nonzero temperature,
   QIP 2017, Seattle, WA, USA, 16-20/01/2017.
5. Dominic V. Else, Stephen D. Bartlett, and Andrew C. Doherty,
   Symmetry protection of measurement based quantum computation in ground states,
   QIP 2013, Beijing, China, 23-27/01/2013.

Invited Research Talks and Lectures

1. *Making Quantum Error Correction Practical*,
   Invited talk at *SFB BeyondC Conference 2022 – Frontiers of Quantum Information Science*, Vienna, Austria 4-9/09/2022.
2. *Quantum Error Correction: The Academic Perspective*,
   Invited tutorial talk at *ESSCIRC – ESSDERC 2020*, Grenoble, France (online due to COVID-19), 14-15/09/2020.
3. *Symmetry, topology, and thermal stability*,
   Invited research talk at *Symmetry, phases of matter, and resources for quantum computing*, Perimeter Institute, Canada, 26-29/11/2019.
4. *Quantum memories and Schrödinger's cat*,
   Invited research talk at SOQUTE, Fudan University, China, 4-8/10/2019.
5. *Self-correction, symmetry, and Schrödinger's cat*,
   Invited research talk at *LFIQIS*, Talkeetna, AK, USA, 18/07/2019.
6. *Topological quantum memories and computational phases*,
   Invited summer school lectures Fudan University, China, 10-11/07/2019.
7. *Quantum memories and Schrödinger's cat*,
   Colloquium at IQC, University of Waterloo, Canada, 10/06/2019.

8. *Quantum memories and Schrödinger's cat*,
   Colloquium at School of Physics, UNSW, Australia, 9/04/2019.
9. *Longitudinal coupling of spin qubits*,
   Invited research talk at *Spin Qubits 4*, Konstanz, 10-14/09/2018.
10. *Spin-qubit quantum computing: Benchmarking, error correction, and fault-tolerance*,
    Invited tutorial lecture at *Spin Qubits 4*, Konstanz, 10-14/09/2018.
11. *New directions in the theory of fault-tolerant quantum computing*,
    Invited research talk at *Spin Qubits 3*, Sydney, 6-10/11/2017.
12. *Contextuality and quantum simulation*,
    Invited research talk at *Contextuality: Conceptual Issues, Operational Signatures, and Applications*, Perimeter Institute, Waterloo, 24-27/7/2017.
13. *Quantum computational phases of matter*,
    Invited lectures at *Canadian Quantum Information Summer School*, Orford, Quebec, 29/5-7/6/2017.
14. *Uncertainty in quantum physics*,
    Invited panel session speaker at *'Peace and Security Under Uncertainty' CISS Global Forum*, Q Station Sydney, 28/4/2017.
15. *Topological phases and quantum information*,
    Invited research talk at *IGA/AMSI Workshop – Topological Matter, Strings, K-theory and related areas*, Adelaide, Australia, 26-30/09/2016.
16. *Quantum mechanics*,
    Invited lecture course in the Perimeter Scholars International (PSI) program at the Perimeter Institute, Waterloo, Canada, 7-23/09/2016.
17. *Topological phases and quantum information*,
    Invited lecture series at *NBI/QDev 2016 Summer School – Quantum Information in Condensed Matter Physics*, Copenhagen, Denmark, 3-8/07/2016.
18. *Stabilizers, Negativity, Contextuality, and Ontological Models*,
    Invited research talk at *Contextuality as a Resource for Quantum Computation* workshop, UCL, London, UK, 20-22/06/2016.
19. *Physics and information in quantum matter: letting the cat out of the box*,
    Invited talk and panel session speaker at *Q3: Q Symposium 2016, 'Peace and Security in a Quantum Age: Moment, Matter, Mind and Metaphysics'*, Q Station Sydney, 11-13/2/2016.
20. *Quantum computational matter*,
    Invited lecture at *Graduate Lecture Series in Quantum Science*, Macquarie University, Sydney, 27/04/2016.
21. *Topological phases and quantum information*,
    Invited research talk at *Gordon Godfrey Workshop on Spins and Strong Electron Correlations 2015*, UNSW, Sydney, Australia, 2-6/11/2015.
22. *Estimating outcome probabilities of quantum circuits using quasiprobabilities*,
    Invited research talk at *Foundations of Quantum Information*, Kelona, B.C., Canada, 6-10/07/2015.
23. *Calibration and Verification of Quantum Gates*,
    Invited research talk at *Spin Qubits 2014*, Konstanz, Germany, 18-22/08/2014.
24. *Suppressing noise with real-time Hamiltonian estimation*,
    Invited research talk at *CIfAR Quantum Information Science Program Meeting*, Quebec, Canada, 03-06/06/2014.
25. *Quantum computational matter*,
    Invited research talk at *Progress towards Practical Quantum Information Processing*, Royal Society, UK, 18/10/2013.

26. *Quantum computational matter*,
    Invited research talk at *UBC-MPG workshop on Quantum Information & Foundations of Quantum Mechanics*, UBC, Vancouver, Canada, 01/07/2013-05/07/2013.
27. *Quantum computational matter*,
    Invited research talk at *Last Frontiers in Quantum Information Science*, Fairbanks, Alaska, USA, 17/06/2013-21/06/2013.
28. *Quantum tomography of spin qubits*,
    Invited research talk at *IARPA workshop on Quantum Characterisation, Verification and Validation*, La Jolla, CA, USA, 30/01/2013-31/01/2013.
29. *Quantum computational matter,*
    Invited research talk at workshop on *Quantum-Photonic Hardware*, Rottnest Island, Australia, 22/10/2012-25/10/2012.
30. *Quantum tomography of spin qubits*,
    Invited research talk at *LPS workshop on Quantum Characterisation, Verification and Validation*, Washington D.C., USA, 30/04/2012-01/05/2012.
31. *Quantum computational matter*,
    Colloquium at the Perimeter Institute for Theoretical Physics, Waterloo, Canada, 12/10/2011.
32. *Quantum computational matter*,
    Colloquium at the School of Physics and Mathematics, University of Queensland, Brisbane, Australia, 23/9/2011.
33. *Quantum computational phases of matter*,
    Invited research talk at *JQI Workshop – From Quantum Information and Complexity to Post-Quantum Information Security*, Joint Quantum Institute, Maryland, USA, 27/10/2010-29/10/2010.
34. *Epistemic vs ontic interpretations of the state of quantum systems in the presence of closed timelike curves*,
    Invited research talk at *PIAF'09 – New Perspectives on the Quantum State*, Perimeter Institute for Theoretical Physics, Waterloo, Canada, 27/9/2009-2/10/2009.
35. *Quantum computers: A new phase of matter?,*
    Invited research talk at *LPHYS'09*, Barcelona, Spain, 13/07/09 - 17/07/09.
36. *Quantum computers: A new phase of matter?,*
    Invited research talk at *Quantum Frontiers Symposium*, Brisbane, Australia, 02/04/09 - 03/04/09.
37. *Quantum reference frames and relationalism in quantum theory*,
    Invited research talk at *The Clock and The Quantum*, Perimeter Institute for Theoretical Physics, Waterloo, Canada, 28/9/2008-2/10/2008.
38. *Identifying Phases of Matter that are Universal for Quantum Computation,*
    Keynote research talk at *Theory Canada 4*, Montreal, Canada, 04/06/08 – 07/06/08.
39. *Encoding a Cartesian frame using clouds of spins,*
    Invited research talk at *Advanced Quantum Measurement* workshop, Leiden, the Netherlands 05/11/07 – 09/11/07.
40. *Universal Control of Optical Quantum Information,*
    Invited research talk at *Frontiers in Optics 2007* (OSA Annual Meeting), San Jose, CA, 16/09/07 - 20/09/07.
41. *Quantum-computational universality and quantum phase transitions in the ground states of spin lattices,*
    Invited research talk at *Iran International Conference on Quantum Information*, Kish Island, Iran, 07/09/07 - 10/09/07.

42. *Optimal eavesdropping strategies in quantum cryptography using photonic quantum control,*
    Invited research talk *Quantum Communications and Quantum Imaging V, SPIE International Symposium on Optics and Photonics*, San Diego, CA, 26/08/07 - 30/08/07.
43. *Quantum operations and measurements on a qubit using feedback control,*
    Invited research talk at *Principles and Applications of Control in Quantum Systems (PRACQSYS 2007)*, Sydney, Australia, 09/07/07 - 13/07/07.
44. *Techniques for group parameter estimation which maximize the likelihood,*
    Invited research talk at *Quantum Algorithms & Applications*, Blue Mountains, Australia, 27/05/2007 - 02/06/2007.
45. *Quantum Control of a Single Qubit*,
    Invited research talk at Workshop on *Quantum - Classical Transition and Quantum Information*, Benasque, Spain, 18/06/2006 – 30/06/2006.
46. *Quantum Resources: Entanglement, Secret Bits & Reference Frames*,
    Three invited lectures at the *TSL Expository Lecture Series*, Theoretical Studies Laboratory, Institute of Advanced Technology, Malaysia, 29/11/2005 – 02/12/2005.
47. *Quantum Computing*,
    Invited tutorial at the *2005 IEEE International Symposium on Information Theory*, Adelaide, Australia, 4-8/9/2005.
48. *Finding Optimal Measurements for State Estimation,*
    Invited research talk at the *MAQIS Workshop: Mathematical Aspects of Quantum Information Science*, University of Queensland, Australia, 27-28/01/2005.
49. *Decoherence-full subsystems and the cryptographic power of a private shared reference frame*,
    Invited research talk at the *1st Asia-Pacific Conference on Quantum Information Science*, Tainan, Taiwan, 10-13/12/2004.
50. *Introduction to Quantum Algorithms*,
    Invited tutorial talk at the *Workshop on Quantum Information and Computation*, NTU, Taipei, Taiwan, 14-15/12/2004.
51. *Mixed State Entanglement in the Light of Pure State Entanglement Constrained by Superselection Rules*,
    Invited research talk at *Reference Frames and Superselection Rules in Quantum Information Theory*, Perimeter Institute for Theoretical Physics, Waterloo, Canada, 12-16/7/2004.
52. *Restrictions in Quantum Information Processing*,
    Invited research talk at *Quantum Theory: Reconsideration of Foundations-2*, Växjö, Sweden, 1-6/6/2003.
53. *Introduction to Quantum Information and Quantum Computation*,
    Five invited lectures at the *NITP Summer School*, Centre for the Subatomic Structure of Matter, Adelaide, Australia, 28-31/1/2003.
54. *Introduction to Quantum Algorithms*,
    Invited lecture for short course at *2002 Conference on Optoelectronic and Microelectronic Materials and Devices (COMMAD)*, University of NSW, Australia, 10/12/2002.
55. *From qubits to continuous variables*,
    Invited research talk, *Quantum Information and Computation Summer School*, University of Queensland, Australia, 15/2/2002.

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Research outputs – publications

Up-to-date publication details are maintained on the following sites:

arXiv: http://arxiv.org/a/bartlett_s_1.html
GoogleScholar: https://scholar.google.com.au/citations?user=eL6YI1wAAAAJ&hl=en
ORCID: http://orcid.org/0000-0003-4387-670X

[1] Markus Frembs, Sam Roberts, Earl T Campbell & Stephen D Bartlett 2023, 'Hierarchies of resources for measurement-based quantum computation', New Journal of Physics, vol. 25, no. 1, pp. 013002, doi:10.1088/1367-2630/acaee2

[2] Samuel C. Smith, Benjamin J. Brown & Stephen D. Bartlett 2023, 'Local Predecoder to Reduce the Bandwidth and Latency of Quantum Error Correction', Physical Review Applied, vol. 19, no. 3, doi:10.1103/physrevapplied.19.034050

[3] Paul Webster, Michael Vasmer, Thomas R. Scruby & Stephen D. Bartlett 2022, 'Universal fault-tolerant quantum computing with stabilizer codes', Physical Review Research, vol. 4, no. 1, doi:10.1103/physrevresearch.4.013092, CE170100009 (2017 - 2024)

[4] Cooper Doyle, Wei-Wei Zhang, Michelle Wang, Bryn A. Bell & Stephen D. Bartlett et al. 2022, 'Biphoton entanglement of topologically distinct modes', Physical Review A, vol. 105, no. 2, doi:10.1103/physreva.105.023513, CE170100009 (2017 - 2024)

[5] T.J. Evans, W. Huang, J. Yoneda, R. Harper & T. Tanttu et al. 2022, 'Fast Bayesian Tomography of a Two-Qubit Gate Set in Sili- con', Physical Review Applied, vol. 17, no. 2, doi:10.1103/physrevapplied.17.024068, CE170100009 (2017 - 2024)

[6] Lawrence Z. Cohen, Isaac H. Kim, Stephen D. Bartlett & Benjamin J. Brown 2022, 'Low-overhead fault-tolerant quantum computing using long-range connectivity', Science Advances, vol. 8, no. 20, doi:10.1126/sciadv.abn1717, CE170100009 (2017 - 2024)

[7] Hakop Pashayan, Oliver Reardon-Smith, Kamil Korzekwa & Stephen D. Bartlett 2022, 'Fast Estimation of Outcome Probabilities for Quantum Circuits', PRX Quantum, vol. 3, no. 2, doi:10.1103/prxquantum.3.020361, CE170100009 (2017 - 2024)

[8] C. G. L. Bøttcher, S. P. Harvey, S. Fallahi, G. C. Gardner & M. J. Manfra et al. 2022, 'Parametric longitudinal coupling be- tween a high-impedance superconducting resonator and a semiconductor quantum dot singlet-triplet spin qubit', Nature Communications, vol. 13, no. 1, doi:10.1038/s41467-022-32236-w, CE170100009 (2017 - 2024)

[9] Mark A. Webster, Benjamin J. Brown & Stephen D. Bartlett 2022, 'The XP Stabiliser Formalism: a Generalisation of the Pauli Stabiliser Formalism with Arbitrary Phases', Quantum, vol. 6, pp. 815, doi:10.22331/q-2022-09-22-815

[10] Pavithran Iyer, Aditya Jain, Stephen D. Bartlett & Joseph Emerson 2022, 'Efficient diagnostics for quantum error correction', Physical Review Research, vol. 4, no. 4, doi:10.1103/physrevresearch.4.043218

[11] J. Pablo Bonilla Ataides, David K. Tuckett, Stephen D. Bartlett, Steven T. Flammia & Benjamin J. Brown 2021, 'The XZZX surface code', Nature Communications, vol. 12, no. 1, doi:10.1038/s41467-021-22274-1, CE170100009 (2017 - 2024)

[12] Y. Kojima, T. Nakajima, A. Noiri, J. Yoneda & T. Otsuka et al. 2021, 'Probabilistic teleportation of a quantum dot spin qubit', npj Quantum Information, vol. 7, no. 1, doi:10.1038/s41534-021-00403-4

[13] J. Yoneda, W. Huang, M. Feng, C. H. Yang & K. W. Chan et al. 2021, 'Coherent spin qubit transport in silicon', Nature Communications, vol. 12, no. 1, doi:10.1038/s41467-021-24371-7

[14] Hakop Pashayan, Stephen D. Bartlett & David Gross 2020, 'From estimation of quantum probabilities to simulation of quantum circuits', Quantum, vol. 4, pp. 223, doi:10.22331/q-2020-01-13-223, CE170100009 (2017 - 2024)

[15] David K. Tuckett, Stephen D. Bartlett, Steven T. Flammia & Benjamin J. Brown 2020, 'Fault-Tolerant Thresholds for the Surface Code in Excess of 5% Under Biased Noise', Physical Review Letters, vol. 124, no. 13, doi:10.1103/physrevlett.124.130501, CE170100009 (2017 - 2024)

[16] Paul Webster & Stephen D. Bartlett 2020, 'Fault-tolerant quantum gates with defects in topological stabilizer codes', Physical Review A, vol. 102, no. 2, doi:10.1103/physreva.102.022403, CE170100009 (2017 - 2024), DP170103073 (2017 - 2019)

[17] Sam Roberts & Stephen D. Bartlett 2020, 'Symmetry-Protected Self-Correcting Quantum Memories', Physical Review X, vol. 10, no. 3, doi:10.1103/physrevx.10.031041, CE170100009 (2017 - 2024), DP170103073 (2017 - 2019)

[18] Thomas B. Smith, Maja C. Cassidy, David J. Reilly, Stephen D. Bartlett & Arne L. Grimsmo 2020, 'Dispersive Readout of Majorana Qubits', PRX Quantum, vol. 1, no. 2, doi:10.1103/prxquantum.1.020313, CE170100009 (2017 - 2024)

[19] Filip K. Malinowski, Frederico Martins, Thomas B. Smith, Stephen D. Bartlett & Andrew C. Doherty et al. 2019, 'Fast spin exchange across a multielectron mediator', Nature Communications, vol. 10, no. 1, doi:10.1038/s41467-019-09194-x, CE170100009 (2017 - 2024)

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THE UNIVERSITY OF SYDNEY

PROFESSOR STEPHEN BARTLETT
School of Physics | Faculty of Science

Research student supervision

Current postgraduate students

Name	Supervisor	Degree	Start Date
Tim Evans	Principal	Ph.D.	2017
Mark Webster	Principal	Ph.D.	2020
Samuel Smith	Principal	Ph.D.	2020
Lawrence Cohen	Principal	Ph.D.	2020
Nicholas Fazio	Principal	Ph.D.	2021
Nouédyn Baspin	Principal	Ph.D.	2022
Stuart Nicholls	Principal	Ph.D.	2023

Completed postgraduate and Honours students

Name	Supervisor	Degree	Completed
Samuel Elman	Principal	Ph.D.	2023
Paul Webster	Principal	Ph.D.	2021
David Tuckett	Principal	Ph.D.	2020
Zach Cristina	Principal	Ph.D.	2020
Hakop Pashayan	Principal	Ph.D.	2019
Angela Karanjai	Principal	Ph.D.	2019
Sam Roberts	Principal	Ph.D.	2019
Zixin Huang	Principal	Ph.D.	2018
Jacob Bridgeman	Principal	Ph.D.	2017
Samuel Elman	Coprincipal	M.Phil.	2017
Rafael Alexander	Principal	Ph.D.	2016
Courtney Brell	Principal	Ph.D.	2015
Andrew Darmawan	Principal	Ph.D.	2014
Dominic Williamson	Principal	M.Sc.	2014
Maki Takahashi	Principal	Ph.D.	2013
Matthew Palmer	Principal	Ph.D.	2013
Joel Wallman	Principal	Ph.D.	2012
Alexandr Sergeevich	Principal	Ph.D.	2012
Danny Chacko	Principal	Honours	2022
Pablo Bonilla Ataides	Principal	Honours (*)	2021
Jack Berry	Principal	Honours	2020
Nicholas Fazio	Principal	Honours	2020
Anthony O'Rourke	Principal	Honours	2020
Angad Bedi	Principal	Honours	2020
Samuel Smith	Principal	Honours (*)	2019
Edgar Tanuarta	Coprincipal	Honours	2019
Ben Macintosh	Coprincipal	Honours	2019
Nicholas Bosch	Principal	Honours	2018
Matthew Winnel	Coprincipal	Honours	2018
Taiga Adair	Principal	Honours (*)	2017
Mitchell Hannah	Principal	Honours	2017
Campbell McLachlan	Principal	Honours (*)	2017
Paul Webster	Principal	Honours (*)	2016
Thomas Smith	Coprincipal	Honours	2016

Hakop Pashayan	Principal	Honours	2015
Matthew Allen	Principal	Honours	2015
Sam Roberts	Principal	Honours (*)	2014
Chris Wykes	Principal	Honours	2013
Jacob Bridgeman	Coprincipal	Honours (*)	2012
Dylan Griffith	Principal	Honours	2012
Dominic Williamson	Principal	Honours (*)	2012
Dominic Else	Coprincipal	Honours (*)	2011
Jessica Bloom	Principal	Honours	2011
Graham White	Principal	Honours (*)	2010
Massoud Aghili	Principal	Honours	2009
Thomas Chung	Principal	Honours	2008
Andrew Darmawan	Principal	Honours (*)	2008
Joel Wallman	Principal	Honours (*)	2008
Tom Griffin	Principal	Honours (*)	2007
Matthew Palmer	Principal	Honours	2007
Lisa Torlina	Principal	Honours (*)	2007
Alex Gray	Principal	Honours	2007
Daniel Yardley	Principal	Honours	2006
Agata Branczyk	Principal	Honours	2005

(*) denotes University Medalist

Success stories in research student supervision

The PhD students I have supervised have taken up postdoctoral positions at top international research groups in quantum information, including the Perimeter Institute (Pashayan, Bridgeman, Brell), Hannover (Brell), and Sherbrooke (Darmawan); others have established research careers within the quantum computing industry (Roberts and Tuckett at PsiQuantum, Alexander at Xanadu). My first PhD completion (Wallman) is an assistant professor at the University of Waterloo and co-founder of the successful quantum computing start-up company *Quantum Benchmark* recently acquired by Keysight Technologies.

Of the Honours students I have supervised, 13 have won University medals. These students have been widely successful; past Honours students have gone on to pursue their PhD research at UC Berkeley, Cambridge, Stanford, UCSB, Vienna, with others continuing at Sydney under my supervision with full scholarships.

Undergraduate research supervision

Dalyell project (Sydney):

- Sepehr Saryazdi, Charles Lilley (2021)
- Jonathan Skelton (2020)
- Maria Djuric, Martine Illing-Kelly, Pablo Ataides (2019)

Senior research project (Sydney):

- Nicholas Fazio, Mackenzie Shaw (2019)
- Jack Davis, Naris Rangsiyawaranon, Samuel Smith, Edgar Tanuarta (2018)
- Edric Wang (2017)
- Taiga Adair, Sean Dawson, James Leung, Campbell McLachlan (2016)
- Paul Webster, Zara Gough, Eric Hester (2015)
- Matthew Allen, Sean Carnaffan, Tyrone Pollard, Diana Nguyen (2014)

- Hakop Pashayan, Sam Roberts, Chris Ryba, Sam Chorazy (2013)
- Jacob Bridgeman, Rafael Alexander (2011)
- Dominic Else (2010)
- Gene Polovy (2009)
- Phillip Lathourakis, Michael Sun, Duncan Sutherland (2007)
- Anthony Krensel, Tristan Randall, Matthew Palmer, Felix Lawrence (2006)
- Tom Griffin (2005)

Special Studies Program / Talented Student Program project (Sydney):

- Christian Canete, Dion Marks, Justin Brown, Lewis Watts, Maria Djuric (2019)
- Dennis Chen, Benjamin Fan, Sam Jakes, Will Stewart (2018)
- Edric Wang (2016)
- Paul Webster (2014)
- Ishraq Uddin (2013)
- Hakop Pashayan (2012)
- Laura McKemmish, Graham White (2008)
- Julian Gibbons, John Sun (2005)

Vacation Scholarship project (Sydney):

- Jack Davis, Will Stewart (2019)
- Ethan Cross, Ethan Ryan, Keith Chambers (2018)
- Taiga Adair, Huang Bao, Sean Dawson, Edric Wang (2017)
- Paul Webster, Edric Wang, Sean Dawson (2016)
- Paul Webster (2015)
- Hakop Pashayan, Sam Roberts (2014)
- Cleo Loi, Hakop Pashayan, Jacob Bridgeman, Dominic Williamson (2013)
- Harry Wood, Dominic Else, Jacob Bridgeman, Rafael Alexander (2012)
- Graham White, Dominic Else, Jacob Bridgeman, Rafael Alexander (2011)
- Graham White, Joel Wallman (2008)
- Matthew Palmer (2007)
- John Truong (2006)

Other

- Raymond Limpus (Masters research project, QUT, 2003 and 2004)
- Agata Branczyk (Vacation scholarship, UQ, 2004)

THE UNIVERSITY OF SYDNEY

PROFESSOR STEPHEN BARTLETT
School of Physics | Faculty of Science

University lecturing

Course	Uni	Years	# Hours Lecture
FIRST YEAR			
PHYS1901 –Physics 1A (Advanced), Mechanics module	Sydney	2010-2017	15
PHYS1902 –Physics 1B (Advanced), Electromagnetism module	Sydney	2005-2011	20
PHYS1004 –Physics 1B (Env and Life Sciences), Radiation module	Sydney	2006-2008	28
ENGG1050 – Engineering Thermodynamics	UQ	2004	18
PHYS1002 – Electromagnetism, Optics, Relativity and Quantum Physics I	UQ	2004	15
SECOND YEAR			
PHYS2012/2912 – Quantum Physics	Sydney	2012-2021	19
THIRD YEAR			
PHYS 3090/3990/3991 – Statistical Mechanics	Sydney	2013-2023	19
PHYS 3051, etc. – Thermodynamics	Sydney	2007-2012	19
PHYS304 – Quantum Physics	Macquarie	2001-2002	18
FOURTH YEAR / GRADUATE			
Honours Quantum Nanoscience	Sydney	2014-2019	20
Honours Advanced Quantum Mechanics	Sydney	2005-2013	20
PHYS440 – Quantum Computing	Macquarie	2002	6
PHYS1435 – Symmetry in Physics	Toronto	1998	18

THE UNIVERSITY OF SYDNEY

PROFESSOR STEPHEN BARTLETT
School of Physics | Faculty of Science

Professional Service

Service to the University

Senior roles in service and management

- Associate Dean Research for the Faculty of Science (2020-2023)
- Associate Head (Research) for School of Physics (2016-2019)
- Domain Leader, Quantum Domain, University of Sydney Nano Institute (2017)
- Member, School Executive Committee, School of Physics (2016- ongoing)
- Member, Sydney Quantum Academy Establishment Committee (2019)

Service on School's Teaching Programs

- Honours Coordinator (2007- 2015)
- Postgraduate research courses working group (2011- ongoing)

Chairing School/Faculty/University Committees

- Chair, Faculty of Science Research Committee (2020-)
- Chair, Research Infrastructure Steering Committee (2021-)
- Chair, Research and Prototyping Foundry Academic Advisory Committee (2021-)
- Chair, Faculty of Science Level D Local Promotions Committee (2020, 2021)
- Chair, Faculty of Science Level E Local Promotions Committee (2018, 2019)
- Chair, School committee to review undergraduate quantum syllabus (2006)

Service on School/Faculty/University Committees

- Member, UE Research Committee (2020-)
- Board Member, Research Excellence PCB (2021-)
- Member, UE Research Subcommittee – Enterprise and Engagement (2020-)
- Member, Research Risk Operations Group (2021-)
- Member, Faculty of Science Dean's Executive Committee (2020-)
- Member, Faculty of Science Board (2020-)
- Core member, Faculty of Science Level E Local Promotions Committee (2016, 2017)
- Member, Faculty of Science Research Committee (2016- 2019)
- Deputy Chair, School of Physics Research Committee (2008)
- Member, School of Physics Research Committee (2006-2009)
- Member, School of Physics Teaching and Learning Committee (2007- 2015)
- Member, Student Recruitment Taskforce (2008)
- Library representative, School of Physics (2005- 2010)

Service to the Discipline

Service to Industry

- Transport for NSW Quantum Expert Advisory Panel member (2021-)
- Executive Board, Sydney Quantum Academy (2020-)
- Advisory Board, Quantum Benchmark Inc. (2018-2021)

Service on Journals

- Lead Editor, *PRX Quantum* (2020-2026)
- Editorial Board, *Physical Review X* (2019-2020)

Service on Professional Societies

- Convenor, Australian Institute of Physics (AIP) Topical Group QUICC (2010- 2014)
- Vice-convenor, AIP Topical Group QUICC (2008,2009)
- Secretary, AIP Topical Group QUICC (2006, 2007)
- Interim Secretary, AIP Topical Group QUICC (2005)

Refereeing for international journals

- Nature, Nature Physics, Nature Communications, Physical Review (A, B, X, Letters), New Journal of Physics, Journal of Physics (A, B), Journal of Optics (B), Physics Letters (A), Optics Letters, Optics Express, Foundations of Physics, Quantum Information and Computation, Quantum, npg Quantum Information

Refereeing for competitive grant applications

- Referee for ARC Discovery Projects
- Referee for ARC Laureate Fellowships, Future Fellowships, Federation Fellowships, DECRA Fellowships
- Referee for U.S. Department of Energy Quantum Testbed Program
- Referee for NWO (The Netherlands) competitive grants
- Referee for US-Israel Binational Science Foundation
- Referee for FQXi (Foundational Questions Institute) large grant scheme
- Referee for Research Corporation (USA) competitive grants
- Referee for NSERC (Canada) competitive grants
- Referee for Austrian Science Fund (Austria) competitive grants
- Referee for A*STAR (Singapore) competitive grants
- Referee for Foundation for Polish Science (Poland) competitive grants
- Referee for New Zealand Endeavor Fund research programs
- Referee for Swiss National Science Foundation competitive grants

Conference and workshop organisation

- Founder and principal organiser, Sydney Quantum Information Theory, workshop series - Sydney, Feb 2006, Jan 2008, Jan 2009, Jan 2010, Jan 2011, Jan 2012, Jan 2013, Jan 2014, Jan 2015, Feb 2016, Feb 2017, Feb 2018, Feb 2019, Feb 2020, Feb 2021, Feb 2022, Feb 2023
- Program committee, Quantum Information Processing – QIP 2022, Pasadena, Mar 2022.
- Program chair, AQIS (Asian Conference on Quantum Information Science), 2020.
- Co-organiser, “QUSENT – Quantum Simulation and Enabling Technologies”, University of Sydney, 3-4 October 2019.
- Program committee, AQIS (Asian Conference on Quantum Information Science), 2016.
- General co-chair, Quantum Information Processing – QIP 2015, Sydney, Jan 2015.
- Program committee, Australian Institute of Physics Congress, Sydney, Dec 2012.
- Program committee, Quantum Information Processing – QIP 2011, Singapore, Jan 2011.
- Organizing committee, QCMC’2010, Brisbane, July 2010.
- Organizing committee, Iran International Conference on Quantum Information, Sept 2010.
- Organizing committee, 5th Conference on the Theory of Quantum Computation, Communication and Cryptography, University of Leeds, UK, April 2010
- Advisory Committee, The Clock and the Quantum, Waterloo, Canada, Sept 2008.
- Principal local organizer, Principles and Applications of Control in Quantum Systems 2007, Sydney, July 2007.
- Co-organiser, “Reference Frames and Superselection Rules in Quantum Information Theory,” Perimeter Institute, Waterloo, Canada, 12-16 July 2004 (with R. W. Spekkens).

Professional Affiliations

- Fellow, Australian Institute of Physics
- Fellow, Royal Society of New South Wales (elected 2020)
- Fellow, American Physical Society (elected 2020)