Dominic W. Berry

Address:	School of Mathematical and Physical Sciences, Macquarie University, NSW, 2109, Australia.
Telephone:	0403 904 210
E-Mail:	dominic.berry@mq.edu.au
Website:	http://www.dominicberry.org
Nationality:	Australian

Positions Held

- **Professor**
  Macquarie University, January 2023 – Present
- **Associate Professor**
  Macquarie University, January 2019 – December 2022
- **Senior Lecturer**
  Macquarie University, October 2015 – December 2018
- **ARC Future Fellow**
  Macquarie University, October 2011 – October 2015
- **Postdoctoral Fellow**
  University of Waterloo, January 2009 – September 2011
- **Research Fellow**
  Macquarie University, September 2006 – December 2008
- **ARC Australian Postdoctoral Research Fellow**
  The University of Queensland, June 2004 – August 2006
- **Macquarie University Research Fellow**
  Macquarie University, January 2003 – June 2004
- **Research Associate**
  Macquarie University, August 2001 – December 2002

Education

Course:	Doctorate of Philosophy
Institution:	The University of Queensland
Field:	Physics
Thesis Title:	Adaptive Phase Measurements
Supervisor:	Prof. Howard Wiseman
Award Date:	February 2002
Attended:	January 1998 – July 2001

Course:	Bachelor of Science, Honours
Institution:	The University of Queensland
Major:	Physics
Thesis Title:	Heating Effects in Optical Trapping
Supervisors:	A/Prof. Norman Heckenberg and Prof. Halina Rubinsztein-Dunlop
Graduation Date:	August 1997
Result:	Class I
Attended:	July 1996 – June 1997

Course:	Bachelor of Science
Institution:	The University of Queensland
Major:	Physics
Graduation Date:	December 1995
Grade Point Average:	6.9/ 7.0
Attended:	January 1993 – December 1995

Research Grants and Contracts

Total of over $8.9 million research income.

Project Title	Investigators	Scheme	Value	Year
Quantum computation combining learning and simulation for molecular design	DW Berry, J Quach, N Rubin	ARC Discovery Project	$683,296	2026
Quantum Solutions for Energy Networks	A Saraiva, B Naito, FA Vargas, G Konstantinou, K Cryan, J Belanger, DW Berry	Critical Technologies Challenge Program	$500,000	2025
Project Lighthouse	DW Berry	Google Sponsored Research Agreement	$2,571,169 (1,756,964 USD)	2022-2026
Defence acquisition optimisation using quantum algorithms	T Lee, M Kieferova, Y Sanders, G Brennen, DW Berry, D Terno	Defence Innovation Network Pilot Project	$149829	2022
Heisenberg-limited lasers: building the revolution	HM Wiseman, DW Berry, B Huard, A Bienfait, M Mirrahimi	ARC Discovery Project	$512835	2022-2025
Quantum differential equations and learning for flight control	DW Berry	Lockheed Martin contract	$170,323 (127,849 USD)	2021
Pushing the digital limits in quantum simulation for advanced manufacturing	N Langford, JP Dehollain, D Burgarth, DW Berry	ARC Discovery Project	$659,755	2021-2024
Project Lighthouse	DW Berry	Google Sponsored Research Agreement	$636,366 (435,911 USD)	2020
Enhanced algorithms for optimization and chemistry	DW Berry	Google Quantum Awards program	$150,000 (100,000 USD)	2020
Optimizing circuits for quantum-enhanced population transfer	DW Berry	Google Quantum Awards program	$152,117 (110,000 USD)	2019
Quantum algorithms for quantum chemistry	DW Berry, R Babbush	ARC Discovery Project	$465,000	2019-2021
Quantum-classical algorithms for linear equations	DW Berry	Lockheed Martin contract	$234,240 (186,232 USD)	2017

Quantum algorithms for computational physics	DW Berry, G Brennen, A Aspuru-Guzik, AM Childs, J Pachos	ARC Discovery Project	$435,600	2016-2018
Quantum algorithms for partial differential equations	DW Berry, S Lloyd, A Harrow, AM Childs	IARPA BAA	$586,000 (421,000 USD)	2016
Robust quantum information and metrology	DW Berry	ARC Future Fellowship	$585,347	2011-2015
Resources for quantum networks	DW Berry	ARC Discovery (APD Fellowship)	$209,466	2004-2007
Theory of resources for quantum networks	DW Berry	Macquarie University Research Fellowship	$182,196	2003
Remote implementation of operations	DW Berry	Macquarie University Startup Grant	$6000	2003
Quantum Properties of Distributed Systems (QUPRODIS)	BC Sanders, SD Bartlett, DW Berry	IAP – International S&T Competitive Grants	$45,000	2003

Citation metrics

My h-index is 56 (from Google Scholar on 26/07/2025), with a total of 15,609 citations and 2101 citations just in 2026 so far. Citation numbers from Scopus are 8533 citations and h-index 45. Three of my publications are ESI Highly Cited papers, and nine are in the top 1% percentile for citations in category according to Web of Science InCites. I have one paper with Field-Weighted Citation Impact (FWCI) of 13.34, and another with 11.88. According to SciVal, 42 are in the top 10% most cited publications, and 29 have FWCI of 3 or more.

Fellowships, Scholarships, Awards and Competitions

- Maquarie University Excellence in Research Award, 2021
- APS Outstanding Referee, 2013
- Australian Future Fellowship, 2010-2013
- Australian Research Council Postdoctoral Fellowship, 2004-2006
- Macquarie University Research Fellowship, 2003-2005
- APA Scholarship, 1998-2001
- University Medal at the University of Queensland, 1997
- The Duncan McNaughton Scholarship, 1996
- Australian Students Prize for Excellence, 1993
- Year 11 (1991) and Senior Dux (1992) at Wynnum High, 1991-1992
- Junior Dux of Science at Wynnum High, 1990
- Inaugural Mathematics Tournament, gold medal, 1990
- The Australian Mathematical Olympiad, silver certificate, 1992

Research Highlights

Quantum simulation is arguably the most important application of quantum computing, because it includes areas such as batteries and catalysts, which are industries worth hundreds of billions per year. Quantum computers can simulate systems that are simply beyond the capability of classical computers, because these are quantum systems with exponential complexity, but are naturally simulatable by the quantum systems in quantum computers. A specific example application is nitrogen fixation, which is needed for producing fertiliser. The industrial process is inefficient, needing 1-2% of world energy consumption. The biological process is far

more efficient, but simulation of the relevant chemical FeMoco (the cofactor in the nitrogenase enzyme) is beyond supercomputer capability.

However, one cannot simply run a program for regular classical computers on a quantum computer. You need a specialised quantum algorithm to run on the quantum computer to achieve the speedup. I have been at the forefront of quantum simulation algorithms for nearly 20 years, from the initial algorithms laying the foundation for simulation, to the latest algorithms providing the best performance.

- My publication [T9], which first appeared as a 2005 preprint, provided the first advanced simulation methods after the original Lloyd algorithm in the 1990s. This work now has **1215 citations**, and was used as part of the basis for the famous Harrow, Hassidim, and Lloyd (HHL) algorithm for solving linear systems [Phys. Rev. Lett. **103**, 150502 (2009)]. That work is particularly impactful, because it opens up a whole host of other applications of quantum computers. In [T9] I also proved what has been dubbed the "no-fast-forwarding theorem", which shows that one cannot simulate the evolution of a quantum system faster than linear in the time to be simulated.
- In 2012 I developed a fundamentally new method for simulation [T7]. Rather than using a Trotter formula as in prior work, I turned the Hamiltonian into a quantum walk, which is now one of the standard methods in the field. This enabled the simulation complexity to be linear in the time, achieving the optimal bound set by the no-fast-forwarding theorem.
- In 2014 I developed another fundamentally new technique, which enabled the simulation complexity to be optimal in terms of the allowable error [T5]. The complexity is now logarithmic in the precision, representing an exponential improvement. In this work we introduced *oblivious* amplitude amplification, a technique that is now standard in the field. This enabled us to deterministically implement a *sum* of unitary operations. This is a fundamentally different principle in quantum computing, because normally performing a sequence of gates on a quantum computer results in a *product* of unitary operations.
- In 2015 I showed how to perform simulation using a linear combination of quantum walks [T3]. This introduced two principles that are now standard in the field. First, approximating time evolution using the Jacobi-Anger expansion, and second, generating Chebyshev polynomials of operators using oblivious amplitude amplification.
- I then developed techniques specifically for the simulation of quantum chemistry. In 2018 I developed many of the now standard techniques for quantum chemistry, including coherent alias sampling and quantum read-only memory [T2]. In 2021 I applied these techniques, along with more compact representations of the system, to bring the complexity for quantum simulation down to the range where it could reasonably be implemented on a quantum computer [T1]. The predicted run time is days for FeMoco, which is a prominent case that is classically intractable. In our most recent work in 2025 we have achieved a new record for the efficiency of these quantum algorithms [2].
- A further important case for these algorithms is simulation of periodic quantum systems, which is relevant to applications such as battery technology and catalysts. I introduced many of the foundational techniques in the area, with a compact representation of the system using plane waves. My advances in the area enabled speedups of about a factor of 1000 over naive methods [22].

The impact of this work is demonstrated by its repeated acceptance at QIP, which is the most important and prestigious conference in the area of quantum information. QIP has a low rate of acceptance (20%), and at QIP 2021 my work was accepted as a *plenary* talk, one of only 12 plenaries out of over 400 submissions. My work has been accepted for oral presentation at QIP 12 times. In the general area of computer science, the two most prestigious conferences are STOC and FOCS, which are regarded as the equivalent of Science and Nature for the physical sciences. My work has been accepted at STOC and twice at FOCS. A further indication of the impact of this work is its support by Google Research. Since 2019 Google has supported my research with approximately $3.5 million of funding, including two Google Quantum Awards and two Google Sponsored Research Agreements.

Beyond my work on quantum algorithms for simulation of *quantum* systems, I have developed quantum algorithms for differential equations and solving linear equations. These algorithms have a very wide range of applications, because they enable simulation of *classical* systems. My 2014 work [T6] is the foundational work on how to solve differential equations on a quantum computer. I introduced the method of encoding the differential equation in a block matrix, and solving using the quantum algorithm for solving linear systems. This still is the standard method of solving differential equations, though recently a new method has been proposed (linear combination of Hamiltonian simulation). The ultimate goal of these algorithms is to be able to solve nonlinear partial differential equations, which is the standard description of classical systems. My work provides the best techniques for this task [5].

Not only this, but in 2022 I developed the fastest known algorithm for solving linear systems [20]. This famous problem is the one first solved by the HHL algorithm, and is the foundation of most algorithms for solving differential equations.

Top 10 Publications

[T1] J. Lee, D. W. Berry, C. Gidney, W. J. Huggins, J. R. McClean, N. Wiebe, and R. Babbush, "Even more efficient quantum computations of chemistry through tensor hypercontraction", *PRX Quantum* **2**, 030305 (2021).
Achieved a new record for the fastest quantum simulation algorithms for classically intractable systems like FeMoco. An ESI Highly Cited paper, with FWCI of 13.34 and 542 citations.

[T2] R. Babbush, C. Gidney, D. W. Berry, N. Wiebe, J. McClean, A. Paler, A. Fowler, and H. Neven, "Encoding Electronic Spectra in Quantum Circuits with Linear T Complexity", *Physical Review X* **8**, 041015 (2018).
Introduced many now standard techniques for simulating quantum chemistry, such as coherent alias sampling and quantum read-only memory. An ESI Highly Cited paper with 750 citations.

[T3] D. W. Berry, A. M. Childs, and R. Kothari, "Hamiltonian simulation with nearly optimal dependence on all parameters", in *Proceedings of the 56th Annual IEEE Symposium on Foundations of Computer Science (FOCS 2015)*, pp. 792–809 (2015).
Showed how to use quantum walks with linear combinations of unitaries for more powerful quantum simulations. Introduced the Jacobi-Anger expansion for simulation that is now standard. In the top 0.2% of cited papers for the subject area according to InCites. 702 citations.

[T4] D. W. Berry, A. M. Childs, R. Cleve, R. Kothari, and R. D. Somma, "Simulating Hamiltonian dynamics with a truncated Taylor series", *Physical Review Letters* **117**, 090502 (2015).
Showed how to perform quantum simulation via a Taylor series using the techniques from my 2014 STOC paper [T5], and achieved exponentially improved precision. An ESI Highly Cited paper with 1157 citations.

[T5] D. W. Berry, A. M. Childs, R. Cleve, R. Kothari, and R. D. Somma, "Exponential improvement in precision for simulating sparse Hamiltonians", in *Proceedings of the 46th Annual ACM Symposium on Theory of Computing (STOC 2014)*, pp. 283–292 (2014).
Showed how to use linear combinations of unitaries approach for quantum simulation, and introduced oblivious amplitude amplification. These are now standard methods in the field. 568 citations.

[T6] D. W. Berry, "High-order quantum algorithm for solving linear differential equations", *Journal of Physics A: Mathematical and Theoretical* **47**, 105301 (2014).
This is the foundational work on how to solve differential equations on quantum computers, providing the basis for most following work in the area. 522 citations.

[T7] D. W. Berry and A. M. Childs, "Black-box Hamiltonian simulation and unitary implementation", *Quantum Information and Computation* **12**, 29 (2012).
The first method for Hamiltonian simulation beyond product formulae. 372 citations.

[T8] 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).
Demonstrated the most accurate possible phase measurements for the first time, as are needed for energy estimation in quantum computing. I am lead theoretician on this paper, and it is based on my previous theoretical work [T10]. 279 citations.

[T9] D. W. Berry, G. Ahokas, R. Cleve, and B. C. Sanders, "Efficient quantum algorithms for simulating sparse Hamiltonians", *Communications in Mathematical Physics* **270**, 359 (2007).
The first advanced simulation methods after original Lloyd algorithm. It was a basis for the HHL algorithm, and the most efficient simulation algorithm until my method using quantum walks [T7]. 1215 citations.

[T10] D. W. Berry and H. M. Wiseman, "Optimal states and almost optimal adaptive measurements for quantum interferometry", *Physical Review Letters* **85**, 5098 (2000).
Developed the first sophisticated feedback methods for high-precision interferometric measurements with nonclassical states. These methods are relevant to performing estimation of energies in quantum simulation. 343 citations.

Journal Publications

[1] M. Bagherimehrab, L. M. Calderón, D. W. Berry, P. Schleich, M. G. Vakili, A. Aldossary, J. A. Angulo, C. Gorgulla, and A. Aspuru-Guzik, "Faster Algorithmic Quantum and Classical Simulations by Corrected Product Formulas", *PRX Quantum* **7**, 033018 (2026).

[2] G. H. Low, R. King, D. W. Berry, Q. Han, A. E. DePrince III, A. White, R. Babbush, R. D. Somma, and Nicholas C. Rubin, "Fast quantum simulation of electronic structure by spectral amplification", *Physical Review X* **15**, 041016 (2025).

[3] L. A. Ostrowski, T. J. Baker, D. W. Berry, and H. M. Wiseman, "Analytical results for laser models producing a beam with sub-Poissonian photon statistics and coherence scaling as the Heisenberg limit", *Physical Review A* **112**, 053724 (2025).

[4] P. C. S. Costa, D. An, R. Babbush, and D. W. Berry, "The discrete adiabatic quantum linear system solver has lower constant factors than the randomized adiabatic solver", *Quantum* **9**, 1887 (2025).

[5] P. C. S. Costa, P. Schleich, M. E. S. Morales, and D. W. Berry, "Further improving quantum algorithms for nonlinear differential equations via higher-order methods and rescaling", *npj Quantum Information* **11**, 141 (2025).

[6] D. W. Berry, Y. Tong, T. Khattar, A. White, T. I. Kim, S. Boixo, L. Lin, S. Lee, G. K. Chan, R. Babbush, and N. C. Rubin, "Rapid initial state preparation for the quantum simulation of strongly correlated molecules", *PRX Quantum* **6**, 020327 (2025).

[7] M. E. S. Morales, P. Costa, G. Pantaleoni, D. K. Burgarth, Y. R. Sanders, and D. W. Berry, "Selection and Improvement of Product Formulae for Best Performance of Quantum Simulation", *Quantum Information & Computation* **25**, 1 (2025).

[8] D. W. Berry, N. C. Rubin, A. O. Elnabawy, G. Ahlers, A. E. DePrince III, J. Lee, C. Gogolin, and R. Babbush, "Quantum Simulation of Realistic Materials in First Quantization Using Non-local Pseudopotentials", *npj Quantum Information* **10**, 130 (2024).

[9] D. W. Berry, D. Motlagh, G. Pantaleoni, and N. Wiebe, "Doubling Efficiency of Hamiltonian Simulation via Generalized Quantum Signal Processing", *Physical Review A* **110**, 012612 (2024).

[10] C. H. Cho, D. W. Berry, and M. H. Hsieh, "Doubling the order of approximation via the randomized product formula", *Physical Review A* **109**, 062431 (2024).

[11] D. W. Berry and P. Costa, "Quantum algorithm for time-dependent differential equations using Dyson series", *Quantum* **8**, 1369 (2024).

[12] N. C. Rubin, D. W. Berry, A. Kononov, F. D. Malone, T. Khattar, A. White, J. Lee, H. Neven, R. Babbush, and A. D. Baczewski, "Quantum computation of stopping power for inertial fusion target design", *PNAS* **121**, e2317772121 (2024).

[13] D. W. Berry, Y. Su, C. Gyurik, R. King, J. Basso, A. Del Toro Barba, A. Rajput, N. Wiebe, V. Dunjko, and R. Babbush, "Quantifying Quantum Advantage in Topological Data Analysis", *PRX Quantum* **5**, 010319 (2024).

[14] R. Babbush, D. W. Berry, R. Kothari, R. D. Somma, and N. Wiebe, "Exponential quantum speedup in simulating coupled classical oscillators", *Physical Review X* **13**, 041041 (2023).

[15] N. C. Rubin, D. W. Berry, F. D. Malone, A. F. White, T. Khattar, A. E. DePrince III, S. Sicolo, M. Küehn, M. Kaicher, J. Lee, and R. Babbush, "Fault-tolerant quantum simulation of materials using Bloch orbitals", *PRX Quantum* **4**, 040303 (2023).

[16] R. Babbush, W. J. Huggins, D. W. Berry, S. F. Ung, A. Zhao, D. R. Reichman, H. Neven, A. D. Baczewski, and J. Lee, "Quantum simulation of exact electron dynamics can be more efficient than classical mean-field methods", *Nature Communications* **14**, 4058 (2023).

[17] P. Najafi, P. C. S. Costa, and D. W. Berry, "Optimum phase estimation with two control qubits", *AVS Quantum Science* **5**, 023802 (2023).

[18] L. O. Conlon, T. Vogl, C. D. Marciniak, I. Pogorelov, S. K. Yung, F. Eilenberger, D. W. Berry, F. S. Santana, R. Blatt, T. Monz, P. K. Lam, S. M. Assad, "Approaching optimal entangling collective measurements on quantum computing platforms", *Nature Physics* **19**, 351 (2023).

[19] T. E. O'Brien, M. Streif, N. C. Rubin, R. Santagati, Y. Su, W. J. Huggins, J. J. Goings, N. Moll, E. Kyoseva, M. Degroote, C. S. Tautermann, J. Lee, D. W. Berry, N. Wiebe, and R. Babbush, "Efficient quantum computation of molecular forces and other energy gradients", *Physical Review Research* **4**, 043210 (2022).

[20] P. C. S. Costa, D. An, Y. R. Sanders, Y. Su, R. Babbush, and D. W. Berry, "Optimal scaling quantum linear systems solver via discrete adiabatic theorem", *PRX Quantum* **3**, 040303 (2022).

[21] M. Bagherimehrab, Y. R. Sanders, D. W. Berry, G. K. Brennen, and B. C. Sanders, "Nearly optimal quantum algorithm for generating the ground state of a free quantum field theory", *PRX Quantum* **3**, 020364 (2021).

[22] Y. Su, D. W. Berry, N. Wiebe, N. Rubin, and R. Babbush, "Fault-tolerant quantum simulations of chemistry in first quantization", *PRX Quantum* **2**, 040332 (2021).

[23] J. Lee, D. W. Berry, C. Gidney, W. J. Huggins, J. R. McClean, N. Wiebe, and R. Babbush, "Even more efficient quantum computations of chemistry through tensor hypercontraction", *PRX Quantum* **2**, 030305 (2021).

[24] Z. Huang, P. P. Rohde, D. W. Berry, P. Kok, J. P. Dowling, and C. Lupo, "Photonic quantum data locking", *Quantum*, **5**, 447 (2021).

[25] T. J. Baker, S. N. Saadatmand, D. W. Berry, and H. M. Wiseman, "The Heisenberg limit for laser coherence", *Nature Physics* **17**, 179 (2021).

[26] Y. R. Sanders, D. W. Berry, P. C. S. Costa, L. W. Tessler, N. Wiebe, C. Gidney, H. Neven, and R. Babbush, "Compilation of Fault-Tolerant Quantum Heuristics for Combinatorial Optimization", *PRX Quantum* **1**, 020312 (2020).

[27] I. D. Kivlichan, C. Gidney, D. W. Berry, N. Wiebe, J. McClean, W. Sun, Z. Jiang, N. Rubin, A. Fowler, A. Aspuru-Guzik, H. Neven, and R. Babbush, "Improved Fault-Tolerant Quantum Simulation of Condensed-Phase Correlated Electrons via Trotterization", *Quantum* **4**, 296 (2020).

[28] D. W. Berry, A. M. Childs, Y. Su, X. Wang, and N. Wiebe, "Time-dependent Hamiltonian simulation with L^1-norm scaling", *Quantum* **4**, 254 (2020).

[29] W. Gorecki, D. W. Berry, H. M. Wiseman, and R. Demkowicz-Dobrzanski, "π-corrected Heisenberg limit", *Physical Review Letters* **124**, 030501 (2020).

[30] D. W. Berry, C. Gidney, M. Motta, J. R. McClean, and R. Babbush, "Qubitization of arbitrary basis quantum chemistry leveraging sparsity and low rank factorization", *Quantum* **3**, 208 (2019).

[31] R. Babbush, D. W. Berry, J. R. McClean, and H. Neven, "Quantum simulation of chemistry with sublinear scaling in basis size", *npj Quantum Information* **5**, 92 (2019).

[32] M. Kieferová, A. Scherer, and D. W. Berry, "Simulating the dynamics of time-dependent Hamiltonians with a truncated Dyson series", *Physical Review A* **99**, 042314 (2019).

[33] R. Babbush, D. W. Berry, and H. Neven, "Quantum Simulation of the Sachdev-Ye-Kitaev Model by Asymmetric Qubitization", *Physical Review A* **99**, 040301(R) (2019).

[34] H. T. Dinani, D. W. Berry, R. Gonzalez, J. R. Maze, and C. Bonato, "Bayesian estimation for quantum sensing in the absence of single-shot detection", *Physical Review B* **99**, 125413 (2019).

[35] Y. R. Sanders, G. H. Low, A. Scherer, and D. W. Berry, "Black-box quantum state preparation without arithmetic", *Physical Review Letters* **122**, 020502 (2019).

[36] S. Daryanoosh, S. Slussarenko, D. W. Berry, H. M. Wiseman, and G. J. Pryde, "Experimental optical phase measurement at the exact Heisenberg limit", *Nature Communications* **9**, 4606 (2018).

[37] R. Babbush, C. Gidney, D. W. Berry, N. Wiebe, J. McClean, A. Paler, A. Fowler, and H. Neven, "Encoding Electronic Spectra in Quantum Circuits with Linear T Complexity", *Physical Review X* **8**, 041015 (2018).

[38] D. W. Berry, M. Kieferová, A. Scherer, Y. R. Sanders, G. H. Low, N. Wiebe, C. Gidney, and R. Babbush, "Improved Techniques for Preparing Eigenstates of Fermionic Hamiltonians", *npj Quantum Information* **4**, 22 (2018).

[39] K. T. Laverick, H. M. Wiseman, H. T. Dinani, and D. W. Berry, "Adaptive estimation of a time-varying phase with coherent states: smoothing can give an unbounded improvement over filtering", *Physical Review A* **97**, 042334 (2018).

[40] R. Babbush, D. W. Berry, Y. R. Sanders, I. D. Kivlichan, A. Scherer, A. Y. Wei, P. J. Love, and A. Aspuru-Guzik, "Exponentially More Precise Quantum Simulation of Fermions in the Configuration Interaction Representation", *Quantum Science and Technology* **3**, 015006 (2018).

[41] D. W. Berry, A. M. Childs, A. Ostrander, and G. Wang, "Quantum algorithm for linear differential equations with exponentially improved dependence on precision", *Communications in Mathematical Physics* **356**, 1057 (2017).

[42] H. T. Dinani and D. W. Berry, "Adaptive estimation of a time-varying phase with a power-law spectrum via continuous squeezed states", *Physical Review A* **95**, 063821 (2017).

[43] L. Novo and D. W. Berry, "Improved Hamiltonian simulation via a truncated Taylor series and corrections", *Quantum Information and Computation* **17**, 0623 (2017).

[44] C. Bonato and D. W. Berry, "Adaptive tracking of a time-varying field with a quantum sensor", *Physical Review A* **95**, 052348 (2017).

[45] Z. Huang, K. R. Motes, P. M. Anisimov, J. P. Dowling, and D. W. Berry, "Adaptive phase estimation with two-mode squeezed-vacuum and parity measurement", *Physical Review A* **95**, 053837 (2017).

[46] S. Roy, D. W. Berry, I. R. Petersen, and E. H. Huntington, "Robust Guaranteed-Cost Adaptive Quantum Phase Estimation", *Physical Review A* **95**, 052322 (2017).

[47] D. W. Berry, A. M. Childs, R. Cleve, R. Kothari, and R. D. Somma, "Exponential improvement in precision for simulating sparse Hamiltonians", *Forum of Mathematics, Sigma* **5** (2017).

[48] D. W. Berry and L Novo, "Corrected quantum walk for optimal Hamiltonian simulation", *Quantum Information and Computation* **16**, 1295 (2016).

[49] K. R. Motes, R. L. Mann, J. P. Olson, N. M. Studer, E. A. Bergeron, A. Gilchrist, J. P. Dowling, D. W. Berry, and P. P. Rohde, "Efficient recycling strategies for preparing large Fock states from single-photon sources: Applications to quantum metrology", *Physical Review A* **94**, 012344 (2016).

[50] H. T. Dinani, M. K. Gupta, J. P. Dowling, and D. W. Berry, "Quantum enhanced spectroscopy with entangled multi-photon states", *Physical Review A* **93**, 063804 (2016).

[51] R. Babbush, D. W. Berry, I. D. Kivlichan, A. Y. Wei, P. J. Love, and A. Aspuru-Guzik, "Exponentially more precise quantum simulation of fermions in second quantization", *New Journal of Physics* **18**, 033032 (2016).

[52] C. Bonato, M. S. Blok, H. T. Dinani, D. W. Berry, M. L. Markham, D. J. Twitchen, and R. Hanson, "Optimized quantum sensing with a single electron spin using real-time adaptive measurements", *Nature Nanotechnology* **11**, 247 (2016).

[53] D. W. Berry, M. Tsang, M. J. W. Hall, and H. M. Wiseman, "Quantum Bell-Ziv-Zakai bounds and Heisenberg limits for waveform estimation", *Physical Review X* **5**, 031018 (2015).

[54] D. W. Berry, A. M. Childs, R. Cleve, R. Kothari, and R. D. Somma, "Simulating Hamiltonian dynamics with a truncated Taylor series", *Physical Review Letters* **114**, 090502 (2015).

[55] D. Hogg, D. W. Berry, and A. I. Lvovsky, "Efficiencies of quantum optical detectors", *Physical Review A* **90**, 053846 (2014).

[56] M. Ringbauer, A. Fedrizzi, D. W. Berry, and A. G. White, "Information causality in the quantum and post-quantum regime", *Scientific Reports* **4**, 6955 (2014).

[57] H. T. Dinani and D. W. Berry, "Loss-resistant unambiguous phase measurement", *Physical Review A* **90**, 023856 (2014).

[58] D. W. Berry, "High-order quantum algorithm for solving linear differential equations", *Journal of Physics A: Mathematical and Theoretical* **47**, 105301 (2014).

[59] A. J. F. Hayes and D. W. Berry, "Swarm optimization for adaptive phase measurements with low visibility", *Physical Review A* **89**, 013838 (2014).

[60] D. W. Berry, R. Cleve, and S. Gharibian, "Gate-efficient discrete simulations of continuous-time quantum query algorithms", *Quantum Information and Computation* **14**, 0001 (2014).

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Conference Invitations

I receive a very large number of conference invitations, far too many to accept. Below is a selection of the more important invited talks.

- APS March Meeting (Anaheim, CA, March 16-21, 2025).
  "Rapid initial state preparation for the quantum simulation of strongly correlated molecules"
  https://summit.aps.org/events/MAR-G34/7
- **Tutorial speaker:** APS March Meeting (Anaheim, CA, March 16-21, 2025).
  "Quantum simulation"
  https://summit.aps.org/events/MAR-4T/1
- Quantum 2.0 Conference and Exhibition (Boston, 13-16 June 2022).
  "New Methods in Quantum Simulation of Chemistry"
  https://www.optica.org/en-us/events/topical_meetings/quantum/schedule/?day=Monday
- Quantum Australia Conference and Careers Fair (Sydney + Online, 23-25 February 2022).
  I was part of the panel for the Quantum Software discussion on 23 February.
- 21th Asian Quantum Information Science Conference (Tokyo, September 1-4, 2021).
  Y. Su, D. W. Berry, N. Wiebe, N. Rubin, and R. Babbush,
  "Fault-tolerant quantum simulations of chemistry in first quantization"
  http://aqis-conf.org/2021/
- 2021 CECAM-Lorentz workshop: Useful Quantum Computation For Quantum Chemistry (Virtual, February 22-26, 2021).
  D. W. Berry, C. Gidney, W. Huggins, J. McClean, N. Wiebe, and R. Babbush,
  "Efficient quantum computation of chemistry through tensor hypercontraction"
  https://www.lorentzcenter.nl/useful-quantum-computation-for-quantum-chemistry.html

- PRACQSYS 2019: Principles and Applications of Control in Quantum Systems (Hong Kong, December 14-18, 2019). D. W. Berry, W. Gorecki, H. M. Wiseman, and R. Demkowicz-Dobrzanski, "Estimation bounds using Kaiser windows" (Cancelled due to Hong Kong protests.)
https://sites.google.com/view/pracqsys2019/home

- Coogee'19 Sydney Quantum Information Theory Workshop (Sydney, February 5-8, 2019). D. W. Berry, M. Kieferová, A. Scherer, Y. Sanders, G. H. Low, N. Wiebe, R. Babbush, C. Gidney, J. McClean, A. Fowler, H. Neven, A. Childs, and R. Kothari,
"Quantum chemistry simulation: How low can you go?"
http://www.physics.usyd.edu.au/quantum/Coogee2019/

- **Keynote speaker:** The 8th Workshop on Quantum Simulation and Quantum Walks (Perth, December 14-16, 2018). D. W. Berry, R. Babbush, C. Gidney, J. McClean, A. Fowler, H. Neven, N. Wiebe, and A. Paler, "Quantum chemistry simulation: How low can you go?" http://www.physics.uwa.edu.au/research/quantum-dynamics-computation/the-8th-workshop-on-quantum-simulation-and-quantum-walk-2018

- AIP Summer meeting (Sydney, December 3-7, 2017).
K. Laverick, H. M. Wiseman, H. T. Dinani, and D. W. Berry, "Adaptive Estimation of a Time-varying Phase with Coherent States"
https://www.openconf.org/aip2017/modules/request.php?module=oc_program&action=summary.php&id=150

- Quantum Summit 2017 (Chengdu, October 11-17, 2017).
D. W. Berry, A. M. Childs, A. Ostrander, and G. Wang, "Quantum algorithm for linear differential equations with exponentially improved dependence on precision"
http://qmeeting.org/quantum-summit-2017/invited-speakers/

- The 4th biennial China–Australia Quantum Control Workshop (Hefei, September 25-28, 2016).
D. W. Berry, H. T. Dinani, K. R. Motes, Z. Huang, H. M. Wiseman, P. M. Anisimov, J. P. Dowling, "Advanced in adaptive phase measurement for nonclassical states"
http://lqcc.ustc.edu.cn/CAQCW16/?pageIndex=2

- Recent Advances in Quantum Metrology (Warsaw, March 2-4, 2016).
D. W. Berry, M. Tsang, M. J. W. Hall, H. M. Wiseman,
"Quantum Bell-Ziv-Zakai bounds and Heisenberg limits for waveform estimation"
http://raqm.phoqus.fuw.edu.pl/

- **Plenary speaker:** International Conference on Quantum Information Processing and Communication (QIPC) (Leeds, September 13-18, 2015).
D. W. Berry, A. Aspuru-Guzik, A. M. Childs, R. Kothari, R. Cleve, and R. D. Somma, "Advances in quantum algorithms for Hamiltonian simulation"
QIPC is one of the premier regular conferences on quantum information, and has been held since 2000.
http://www.qipc2015.leeds.ac.uk/home/plenary-speakers.html

- Last Frontiers in Quantum Information Science 3 (Homer Alaska, June 22-26, 2015).
D. W. Berry, A. Aspuru-Guzik, A. M. Childs, R. Kothari, R. Cleve, and R. D. Somma, "Advances in quantum algorithms for Hamiltonian simulation"

- Heilbronn Quantum Algorithms Meeting (Bristol, April 13-14, 2015).
D. W. Berry, A. Aspuru-Guzik, A. M. Childs, R. Kothari, R. Cleve, and R. D. Somma, "Advances in quantum algorithms for Hamiltonian simulation"
https://www.maths.bris.ac.uk/events/meetings/meeting/index.php?meeting_id=144

- **Keynote speaker:** Quantum Simulations and Quantum Walks 2014 (Durban, November 24-28, 2014). D. W. Berry, A. M. Childs, R. Cleve, R. Kothari, and R. D. Somma, "Hamiltonian simulation with nearly optimal dependence on all parameters" http://quantum.ukzn.ac.za/events/QSQW2014

- Australia-Japan Workshop on Multi-user Quantum Networks (Sydney, October 22-24, 2014).
  D. W. Berry, A. M. Childs, R. Cleve, R. Kothari, and R. D. Somma, "Exponential improvement in precision for simulating sparse Hamiltonians" http://quantum-lab.org/ajw2014.php

- 3rd Biennial China-Australia Quantum Control Workshop (Brisbane, September 29 - October 3, 2014). D. W. Berry, M. Tsang, M. J. W. Hall, H. M. Wiseman, "The Heisenberg limit for waveform estimation" https://www.griffith.edu.au/conference/china-australia-quantum-control-workshop/speakers2

- Aspen Winter Conference on Advances in Quantum Algorithms and Computation (Aspen, March 9-14, 2014). D. W. Berry, A. M. Childs, R. Cleve, R. Kothari, and R. D. Somma, "Exponential improvement in precision for simulating sparse Hamiltonians" http://www.aspenphys.org/physicists/winter/2014/quantum/Participants.html

- American Physical Society March Meeting (Denver, March 3-7, 2014).
  D. W. Berry, A. M. Childs, R. Cleve, R. Kothari, and R. D. Somma, "Exponential improvement in precision for simulating sparse Hamiltonians"
  The APS March Meeting is the main conference organised by the American Physical Society, and attracts thousands of participants each year.
  http://meetings.aps.org/Meeting/MAR14/APS_Invited

- China-Australia Quantum Control Workshop (Beijing, November 5-8, 2012).
  D. W. Berry, M. J. W. Hall, M. Zwierz, and H. M. Wiseman, "Universality of the Heisenberg Limit for Estimates of Random Phase Shifts"

- ONR Entanglement Beyond the Optical Regime (Anaheim, February 8-11, 2010).
  D. W. Berry, G. Y. Xiang, B. L. Higgins, H. M. Wiseman, and G. J. Pryde, "Entanglement-enhanced measurement of a completely unknown phase"
  This was an invitation-only event organised by the Office of Naval Research, with the top researchers in the area of quantum metrology.
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- DEX-SMI workshop on quantum statistical inference (Tokyo, March 2-4, 2009).
  D. W. Berry, B. L. Higgins, H. M. Wiseman, S. D. Bartlett, M. W. Mitchell, and G. J. Pryde, "Phase measurements at the theoretical limit"
  http://www.math.nagoya-u.ac.jp/ masahito/workshop/program-NII.html

- **Keynote speaker:** The Principles and Applications of Control in Quantum Systems (PRACQSYS), (Sydney, July 9-13, 2007). B. L. Higgins, D. W. Berry, S. D. Bartlett, H. M. Wiseman, and G. J. Pryde, "Theory of entanglement-free Heisenberg-limited phase estimation"
  http://www.physics.usyd.edu.au/quantum/PRACQSYS2007/agenda.html

- XI International Conference on Quantum Optics (Minsk, May 26-31, 2006). D. W. Berry, "Implementation of multipartite unitary operations with limited resources"
  http://master.basnet.by/icqo2006/Programme.htm

- SPIE International Symposium on Optics and Photonics (San Diego, CA, July 31 – August 4, 2005). D. W. Berry, "Qubit channels that achieve capacity with two states"

- X International Conference on Quantum Optics (Minsk, May 30 – June 3, 2004).
  D. W. Berry, S. Scheel, C. R. Myers, B. C. Sanders, P. L. Knight, and R. Laflamme, "Postprocessing single photon sources via linear optics and photodetection"
  http://master.basnet.by/icqo2004/programme.htm

Major Conferences

My work has been accepted at both **STOC** and **FOCS**. These are the two most prestigious conferences in the area of computer science, and are regarded as the equivalent of Science and Nature for the physical sciences. In the following the presenting author is underlined.

1. R. Babbush, D. W. Berry, R. Kothari, R. Somma, and N. Wiebe, "Exponential quantum speedup in simulating coupled classical oscillators", In Proceedings of the 64th IEEE Symposium on Foundations of Computer Science (FOCS 2023), pages 405-414 (2023).

2. D. W. Berry, A. M. Childs, and R. Kothari, "Hamiltonian simulation with nearly optimal dependence on all parameters", In Proceedings of the 56th Annual Symposium on Foundations of Computer Science (FOCS 2015), pages 792-809 (2015).

3. D. W. Berry, A. M. Childs, R. Cleve, R. Kothari, and R. D. Somma, "Exponential improvement in precision for simulating sparse Hamiltonians", In Proceedings of the 46th Annual ACM Symposium on Theory of Computing (STOC 2014), pages 283-292 (2014).

The most important and prestigious conference in the area of quantum information is **QIP**. **QIP** has a low rate of acceptance (20%), and at **QIP 2021** my work was accepted as a *plenary* talk, one of only 12 plenaries out of over 400 submissions. My work has been accepted for oral presentation at **QIP 13** times, and for poster presentations several other times.

4. G. H. Low, R. King, D. W. Berry, Q. Han, A. E. DePrince III, A. White, R. Babbush, R. D. Somma, and Nicholas C. Rubin, "Sum of Squares Spectral Amplification", oral presentation at QIP 2026 – The 29th Conference on Quantum Information Processing (Riga, Latvia, January 24-30, 2026).

5. R. D. Somma, R. Babbush, D. W. Berry, R. Kothari, and N. Wiebe, "Exponential quantum speedup in simulating coupled classical oscillators", short **plenary** oral presentation at QIP 2024 – The 27th Conference on Quantum Information Processing (Taipei, January 13-19, 2024).

6. D. W. Berry, Y. Su, C. Gyurik, R. King, J. Basso, A. Del Toro Barba, A. Rajput, N. Wiebe, V. Dunjko, and R. Babbush, "Quantifying Quantum Advantage in Topological Data Analysis", oral presentation at QIP 2023 – The 26th Conference on Quantum Information Processing (Ghent, February 6-10, 2023).

7. P. C. S. Costa, D. An, Y. R. Sanders, Y. Su, R. Babbush, and D. W. Berry, "Optimal scaling quantum linear systems solver via discrete adiabatic theorem", oral presentation at QIP 2022 – The 25th Conference on Quantum Information Processing (Pasadena, March 7-11, 2022).

8. J. Lee, D. W. Berry, C. Gidney, W. Huggins, J. McClean, N. Wiebe, and R. Babbush, "Efficient quantum computation of chemistry through tensor hypercontraction", **plenary** oral presentation at QIP 2021 – The 24th Conference on Quantum Information Processing (Munich, February 1-5, 2021).

9. Y. R. Sanders, D. W. Berry, P. Costa, L. W. Tessler, N. Wiebe, C. Gidney, H. Neven, and R. Babbush, "Compilation of Fault-Tolerant Quantum Heuristics for Combinatorial Optimization", oral presentation at QIP 2021 – The 24th Conference on Quantum Information Processing (Munich, February 1-5, 2021).

10. D. W. Berry, C. Gidney, M. Motta, J. R. McClean, and R. Babbush, "Qubitization of arbitrary basis quantum chemistry leveraging sparsity and low rank factorization", oral presentation at QIP 2020 – The 23rd Conference on Quantum Information Processing (Shenzhen, January 6-10, 2020).
http://www.szpclab.com/qip2020#/programDetails

11. R. Babbush, C. Gidney, D. W. Berry, N. Wiebe, J. McClean, A. Paler, A. Fowler, and H. Neven, "Simulating correlated electrons in the surface code with a single T-factory", oral presentation at QIP 2019 – The 22nd Conference on Quantum Information Processing (Boulder, January 14-18, 2019).
http://jila.colorado.edu/qip2019/program.html

12. D. W. Berry, M. Kieferová, A. Scherer, Y. Sanders, G. H. Low, N. Wiebe, J. McClean, H. Neven, C. Gidney, and R. Babbush, "Quantum simulation of chemistry with sublinear scaling in basis size", and G. H. Low and N. Wiebe, "Hamiltonian simulation in the interaction picture", merged oral presentation at QIP 2019 – The 22nd Conference on Quantum Information Processing (Boulder, January 14-18, 2019).
http://jila.colorado.edu/qip2019/program.html

13. D. W. Berry, A. M. Childs, and R. Kothari, "Hamiltonian simulation with nearly optimal dependence on all parameters", oral presentation at QIP 2015 – The 18th Conference on Quantum Information Processing (Sydney, January 12-16, 2015).
http://www.quantum-lab.org/qip2015/AcceptedTalks.php

14. D. W. Berry, R. Cleve, and S. Gharibian, "Exponential improvement in precision for Hamiltonian-evolution simulation", and A. M. Childs, and R. Kothari, "Quantum simulation of sparse Hamiltonians and continuous queries with optimal error dependence", merged oral presentation at QIP 2014 – 17th Conference on Quantum Information Processing (Barcelona, February 03-07, 2014).
http://benasque.org/2014QIP/cgi-bin/program.pl

15. D. W. Berry, R. Cleve, and S. Gharibian, "Discrete simulations of continuous-time query algorithms that are efficient with respect to queries, gates and space", oral presentation at QIP 2012 – 15th Workshop on Quantum Information Processing (Montreal, December 12-16, 2011).
http://www.iro.umontreal.ca/∼qip2012/scientific_e.php

16. D. W. Berry and A. M. Childs, "The query complexity of Hamiltonian simulation and unitary implementation", oral presentation at QIP 2010 – 13th Workshop on Quantum Information Processing (Zurich, January 15-22, 2010).
http://www.qip2010.ethz.ch/programme

Other Conferences

17. D. W. Berry, Y. Tong, T. Khattar, A. White, T. I. Kim, S. Boixo, L. Lin, S. Lee, G. K. Chan, R. Babbush, and N. C. Rubin, "Rapid initial state preparation for quantum chemistry simulation", talk at the 25th Australian Institute of Physics Conference (Melbourne, December 2-5, 2024).

18. M. E. S. Morales, P. Costa, G. Pantaleoni, D. K. Burgarth, Y. R. Sanders, and D. W. Berry, "High-performance Trotter formulae for quantum simulation", talk at the 25th Australian Institute of Physics Conference (Melbourne, December 2-5, 2024).

19. P. C. S. Costa, P. Schleich, M. E. S. Morales, and D. W. Berry, "Further improving quantum algorithms for nonlinear differential equations via higher-order methods and rescaling", talk at the 25th Australian Institute of Physics Conference (Melbourne, December 2-5, 2024).

20. P. C. S. Costa, D. An, R. Babbush, and D. W. Berry, "The discrete adiabatic quantum linear system solver has the best cost in practice", talk at the 25th Australian Institute of Physics Conference (Melbourne, December 2-5, 2024).

21. D. W. Berry, D. Motlagh, G. Pantaleoni, and N. Wiebe, "Doubling efficiency of Hamiltonian simulation via Quantum Signal Processing", talk at the 25th Australian Institute of Physics Conference (Melbourne, December 2-5, 2024).

22. D. An, P. C. S. Costa, and D. W. Berry, "Large time-step discretisation of adiabatic quantum dynamics", talk at the 25th Australian Institute of Physics Conference (Melbourne, December 2-5, 2024).

23. D. W. Berry, N. Rubin, A. Elnabawy, G. Ahlers, E. DePrince, J. Lee, C. Gogolin, and R. Babbush, "Efficient Quantum Simulation of Solid-State Materials via Pseudopotentials", talk at the 19th Theory of Quantum Computation, Communication and Cryptography (TQC) (Okinawa, Japan, 9-13 September 2024).

24. N. Rubin, D. W. Berry, A. Kononov, F. Malone, T. Khattar, A. White, J. Lee, H. Neven, R. Babbush, and A. Baczewski, "Quantum computation of stopping power for inertial fusion target design", talk at the 19th Theory of Quantum Computation, Communication and Cryptography (TQC) (Okinawa, Japan, 9-13 September 2024).

25. P. C. S. Costa, P. Schleich, M. Morales, and D. W. Berry, "Further improving quantum algorithms for nonlinear differential equations via higher-order methods and rescaling", talk at the 19th Theory of Quantum Computation, Communication and Cryptography (TQC) (Okinawa, Japan, 9-13 September 2024).

26. D. W. Berry, Y. Su, C. Gyurik, R. King, J. Basso, A. Del Toro Barba, A. Rajput, N. Wiebe, V. Dunjko, and R. Babbush, "Reducing overhead for quantum advantage in topological data analysis", talk at the 24th Australian Institute of Physics Conference (Adelaide, December 11-16, 2022).

27. D. W. Berry and P. Costa, "Quantum algorithm for time-dependent differential equations using Dyson series", talk at the 24th Australian Institute of Physics Conference (Adelaide, December 11-16, 2022).

28. P. C. S. Costa, D. An, Y. R. Sanders, Y. Su, R. Babbush, and D. W. Berry, "Optimal scaling quantum linear systems solver via discrete adiabatic theorem", talk at the 24th Australian Institute of Physics Conference (Adelaide, December 11-16, 2022).

29. Y. Su, D. W. Berry, N. Wiebe, N. Rubin, and R. Babbush, "Fault-tolerant quantum simulations of chemistry in first quantization", invited oral presentation at 21st Asian Quantum Information Science Conference (Tokyo, September 1-4, 2021).

30. J. Lee, D. W. Berry, C. Gidney, W. Huggins, J. McClean, N. Wiebe, and R. Babbush, "Even more efficient quantum computations of chemistry through tensor hypercontraction", talk at the 16th Conference on the Theory of Quantum Computation, Communication and Cryptography (Latvia, July 5-8, 2021).

31. J. Lee, D. W. Berry, C. Gidney, W. Huggins, J. McClean, N. Wiebe, and R. Babbush, "Even more efficient quantum computations of chemistry through tensor hypercontraction", talk at the 20th Asian Quantum Information Science Conference (Sydney, December 7-9, 2020).

32. Y. R. Sanders, D. W. Berry, P. Costa, L. W. Tessler, N. Wiebe, C. Gidney, H. Neven, and R. Babbush, "Compilation of Fault-Tolerant Quantum Heuristics for Combinatorial Optimization", talk at the 20th Asian Quantum Information Science Conference (Sydney, December 7-9, 2020).

33. Y. Sanders, G. H. Low, A. Scherer, and D. W. Berry, "Black-box quantum state preparation without arithmetic", long talk at the 19th Asian Quantum Information Science Conference (Seoul, August 19-23, 2019).

34. N. Saadatmand, Travis Baker, D. W. Berry, and H. Wiseman, "The Heisenberg limit for laser coherence", long talk at the 19th Asian Quantum Information Science Conference (Seoul, August 19-23, 2019).

35. D. W. Berry, R. Babbush, C. Gidney, J. McClean, A. Fowler, H. Neven, N. Wiebe, and A. Paler, "Encoding Electronic Spectra in Quantum Circuits with Linear T Complexity", talk at the 23rd Australian Institute of Physics Conference (Perth, December 9-13, 2018).

36. D. W. Berry, R. Babbush, C. Gidney, J. McClean, A. Fowler, H. Neven, N. Wiebe, and A. Paler, "Encoding Electronic Spectra in Quantum Circuits with Linear T Complexity", plenary talk at the 18th Asian Quantum Information Science Conference (Nagoya, September 8-12, 2018).

37. D. W. Berry, A. M. Childs, A. Ostrander, and G. Wang, "Quantum algorithm for linear differential equations with exponentially improved dependence on precision", oral presentation at the 17th Asian Quantum Information Science Conference (Singapore, September 4-8, 2017).

38. H. T. Dinani, D. W. Berry, and H. M. Wiseman, "Adaptive estimation of time-varying phase with power-law spectrum", oral presentation at APPC-AIP Congress (Brisbane, December 4-8, 2016).

39. D. W. Berry and L. Novo, "Corrected quantum walk for optimal Hamiltonian simulation", oral presentation at APPC-AIP Congress (Brisbane, December 4-8, 2016).

40. R. Babbush, D. W. Berry, I. Kivlichan, A. Wei, D. Southwood, P. Love and A. Aspuru-Guzik, "Higher-Efficiency Quantum Algorithms for Simulation of Chemistry", long talk at the 16th Asian Quantum Information Science Conference (Taipei, August 29 – September 2, 2016).

41. H. T. Dinani, M. Gupta, D. W. Berry, and J. Dowling, "Quantum enhanced absorption spectroscopy", oral presentation at CLEO/Europe – EQEC 2015 (Munich, June 21-25, 2015).

42. D. W. Berry, M. Tsang, M. J. W. Hall, and H. M. Wiseman, "The Heisenberg limit for a varying phase", oral presentation at the Australian Institute of Physics Congress (Canberra, December 7-11, 2014).

43. H. T. Dinani and D. W. Berry, "Loss-resistant unambiguous phase measurement", oral presentation at the Australian Institute of Physics Congress (Canberra, December 7-11, 2014).

44. M. Ringbauer, A. Fedrizzi, D. W. Berry, and A. G. White, "Quantum correlations beyond Tsirelson's bound", oral presentation at CLEO: Conference on Lasers and Electro-Optics (San Jose, June 8-13, 2014).

45. D. W. Berry, R. Cleve, and R. D. Somma, "Hamiltonian simulation with complexity polylogarithmic in the error", oral presentation at the 13th Asian Quantum Information Science Conference (Chennai, August 25-30, 2013).

46. H. T. Dinani and D. W. Berry, "Loss resistant phase measurement", poster presentation at Quantum Information Processing and Communication International Conference (Florence, June 30 – July 5, 2013).

47. D. W. Berry, M. J. W. Hall, and H. M. Wiseman, "Ultimate Limits to Quantum-Enhanced Optical Phase Tracking", oral presentation at CLEO: Conference on Lasers and Electro-Optics (San Jose, June 9-14, 2013).

48. D. W. Berry, M. J. W. Hall, M. Zwierz, and H. M. Wiseman, "Universality of the Heisenberg limit", oral presentation at the 20th Australian Institute of Physics Congress (Sydney, December 9-13, 2012).

49. D. W. Berry, R. Cleve, and S. Gharibian, "Gate-Efficient Discrete Simulations of Continuous -Time Query Algorithms", oral presentation at the 12th Asian Quantum Information Science Conference (Suzhou, August 23-26, 2012).

50. M. J. W. Hall, D. W. Berry, M. Zwierz, and H. M. Wiseman, "Universality of the Heisenberg Limit for Estimates of Random Phase Shifts", oral presentation at the Quantum Electronics and Laser Science Conference (San Jose, May 6-11, 2012).

51. D. W. Berry, "Quantum Algorithm for Solving Linear Differential Equations", oral presentation at the 11th Asian Quantum Information Science Conference (Busan, August 23-30, 2011).

52. D. W. Berry and A. I. Lvovsky, "Conservation of Vacuum in an Interferometer", oral presentation at the Quantum Electronics and Laser Science Conference (Baltimore, May 1-6, 2011).

53. H. Yonezawa, D. Nakane, T. A. Wheatley, K. Iwasawa, S. Takeda, H. Arao, D. W. Berry, T. C. Ralph, H. M. Wiseman, E. Huntington, and A. Furusawa, "Squeezing-enhanced adaptive optical phase estimation ", oral presentation at Quantum Electronics and Laser Science Conference (Baltimore, May 1-6, 2011).

54. D. W. Berry and A. I. Lvovsky, "Conservation of Vacuum in an Interferometer", oral presentation at the APS March meeting (Dallas, March 21-25, 2011).

55. D. W. Berry, G. Y. Xiang, B. L. Higgins, H. M. Wiseman, and G. J. Pryde, "Entanglement-enhanced measurement of a completely unknown phase", oral presentation at the Quantum Electronics and Laser Science Conference (San Jose, May 16-21, 2010).

56. D. Nakane, T. A. Wheatley, D. W. Berry, H. Yonezawa, H. Arao, D. T. Pope, T. C. Ralph, H. M. Wiseman, E. H. Huntington, and A. Furusawa, "Adaptive Optical Phase Estimation", oral presentation at the Quantum Electronics and Laser Science Conference (San Jose, May 16-21, 2010).

57. D. W. Berry and A. M. Childs, "The complexity of implementing $N \times N$ black-box unitaries is $O(N^{3/4})$", oral presentation at the 9th Asian Conference on Quantum Information Science (Nanjing, August 26-29, 2009).

58. D. W. Berry, B. L. Higgins, H. M. Wiseman, S. D. Bartlett, M. W. Mitchell, and G. J. Pryde, "Theory for Heisenberg Limited Phase Measurement", oral presentation at the 18th National AIP Physics Congress (Adelaide, November 30 – December 5, 2008).

59. D. W. Berry, H. Jeong, M. Stobińska, and T. C. Ralph, "The CHSH-Bell inequality and Tsirelson's bound with postselection", oral presentation at the Quantum Electronics and Laser Science Conference (San Jose, May 4-9, 2008).

60. B. L. Higgins, H. M. Wiseman, G. J. Pryde, D. W. Berry, and S. D. Bartlett, "Entanglement-Free, Heisenberg-Limited Phase Measurement", oral presentation at the Quantum Electronics and Laser Science Conference (San Jose, May 4-9, 2008).

61. T. A. Wheatley, E. H. Huntington, D. W. Berry, H. M. Wiseman, and T. C. Ralph, "Quantum Optical Adaptive Phase Estimation of Sidebands", oral presentation at the Quantum Electronics and Laser Science Conference (San Jose, May 4-9, 2008).

62. D. W. Berry, B. L. Higgins, S. D. Bartlett, H. M. Wiseman, and G. J. Pryde, "Entanglement-free Heisenberg-limited phase estimation", oral presentation at Noise Information & Complexity @ Quantum Scale (Erice, November 4-10, 2007).

63. D. W. Berry, "Remote implementation of multipartite unitary operations", poster presentation at AIP Congress, (Brisbane, December 3-8, 2006).

64. D. W. Berry, H. M. Wiseman, and E. Huntington, "Adaptive Phase Measurements for Narrowband Squeezed Beams", oral presentation at the Quantum Electronics and Laser Science Conference (Long Beach, May 21-26, 2006).

65. D. W. Berry, "Qubit channels that achieve capacity with two states", poster presentation at the Australasian Conference on Optics, Lasers and Spectroscopy (Rotorua, December 5-9, 2005).

66. D. W. Berry, "Qubit channels that achieve capacity with two states", poster presentation at the ERATO conference on Quantum Information Science (Tokyo, August 26-30, 2005).

67. M. G. Raymer, A. C. Funk, and D. W. Berry, "Secure quantum key distribution using squeezed macroscopic light pulses", oral presentation at the SPIE International Symposium on Optics and Photonics (San Diego, July 31 – August 4, 2005).

68. D. W. Berry, S. Scheel, C. R. Myers, B. C. Sanders, P. L. Knight and R. Laflamme, "Improving single photon sources via linear optics and photodetection", oral presentation at Fluctuations and Noise in Photonics and Quantum Optics II (Gran Canaria, Spain, 25-28 May 2004).

69. D. W. Berry, S. Scheel, C. R. Myers, B. C. Sanders, P. L. Knight, and R. Laflamme, "Postprocessing single photon sources via linear optics and photodetection", oral presentation at the Quantum Electronics and Laser Science Conference (San Francisco, May 16-21, 2004).

70. A. C. Funk, M. G. Raymer, and D. W. Berry, "Experimental demonstration of secure quantum key distribution using macroscopic non-classical optical pulses", oral presentation at the Quantum Electronics and Laser Science Conference (San Francisco, May 16-21, 2004).

71. D. W. Berry, S. Scheel, C. R. Myers, B. C. Sanders, P. L. Knight, and R. Laflamme, "Improving single photon sources via linear optics and photodetection", oral presentation at the Australasian Conference on Optics, Lasers and Spectroscopy (Melbourne, December 1-4, 2003).

72. D. W. Berry and B. C. Sanders, "Numerical analysis of capacities for two-qubit unitary operations", poster presentation at the 4th European QIPC Workshop (Oxford, July 13-17, 2003).

73. D. W. Berry and B. C. Sanders, "Quantum Teleportation and Entanglement Swapping for Systems of Arbitrary Spin", oral presentation at the Quantum Electronics and Laser Science Conference (Long Beach, May 19-24, 2002).

74. D. W. Berry and B. C. Sanders, "Quantum teleportation and entanglement swapping for systems of arbitrary spin", oral presentation at the Australasian Conference on Optics, Lasers and Spectroscopy (Brisbane, December 3-6, 2001).

75. D. W. Berry and H. M. Wiseman, "Adaptive measurements and Optimal states for Quantum Interferometry", oral presentation at the Quantum Electronic and Laser Science Conference (Baltimore, May 6-11, 2001).

76. D. W. Berry and H. M. Wiseman, "Adaptive measurements and optimal states for quantum interferometry", oral presentation at the 14th National Congress of the Australian Institute of Physics (Adelaide, December 10-15 2000).

77. D. W. Berry, N. R. Heckenberg, and H. Rubinsztein-Dunlop, "Strong heating effects in optical trapping", oral presentation at the Australasian Conference on Optics, Lasers and Spectroscopy (Christchurch, December 14-17, 1998).

Service

- Judge for XPRIZE Quantum Applications. XPRIZE Quantum Applications is a 3-year, $5M global competition designed to generate quantum computing algorithms that can be put into practice to help solve real-world challenges.
- I served on the Quantum Expert Advisory Panel for TfNSW (Transport for NSW) for their quantum technology initiative.
  https://www.transport.nsw.gov.au/data-and-research/quantum-technology
- I am on the Technical Advisory Committee for the Sydney Quantum Academy.
- Chair of Program Committee for QSim 2026.
- Conference program committees:
  - QIP 2026
    https://qip2026.lu.lv/
  - QSim 2025
    https://qsimconference.org/
  - QSim 2024
    https://qsimconference.org/
  - QIP 2023 – the 26th Workshop on Quantum Information Processing. QIP is the most important conference in the area of quantum information.
    https://indico.cern.ch/event/1175020/page/26159-program-committee
  - QCE 2022 – 2022 IEEE International Conference on Quantum Computing & Engineering (QCE).
    https://qce.quantum.ieee.org/2022
  - TQC 2022 – 17th Conference on the Theory of Quantum Computation, Communication and Cryptography.
    https://tqc2022-conference.iquist.illinois.edu/people/
  - 14th Pacific Rim Conference on Lasers and Electro-Optics (CLEO).
    https://www.cleopr2020.org/committees/program-commitees/
  - QCTIP 2019 – Quantum Computing Theory in Practice.
    https://www.bristolmathsresearch.org/meeting/qctip/
  - TQC 2018 – The Conference on the Theory of Quantum Computation, Communication and Cryptography.
    https://www.tqc2018.org/
  - QCMC 2018 – The International Conference on Quantum Communication, Measurement and Computing.
    http://qcmc18.phys.lsu.edu/committees.htm
  - TQC 2017 – The Conference on the Theory of Quantum Computation, Communication and Cryptography.
    http://tqc2017.lip6.fr/committees.html

- ▷ QIP 2016 – the 19th Workshop on Quantum Information Processing. http://ucalgary.ca/qip2016/home/committees
- ▷ AQIS'16 – the 16th Asian Quantum Information Science Conference. http://aqis-conf.org/2016/committees/

- Since the start of 2019 I have been an editor for the Nature Publishing Group journal npj Quantum Information.

- From 30 March 2015 to 2019 I was an editor for the Nature Publishing Group journal Scientific Reports.

- To build public outreach, on July 20, 2015 I gave a public lecture to the Australian Computer Society titled "QUANTUM COMPUTING – What Can You Do with a Quantum Computer?". https://www.acs.org.au/insightsandpublications/news-archive/2015/72331.html

- In 2013 I produced a 23 minute video explaining the basics of quantum computing, which I posted to YouTube. http://www.youtube.com/watch?v=8fku9iryXGY

- My talk at Microsoft Research on Hamiltonian simulation is on YouTube. https://www.youtube.com/watch?v=hgfIVCJrur8

- My talk at QIP 2015 is on YouTube. https://www.youtube.com/watch?v=wQB6z-7R-Io

- On September 4-12, 2013, I gave a series of three lectures on introductory quantum algorithms for the Department of Computer Science, as well as the Department of Physics and Astronomy.

- On June 18-21, 2013 I gave a series of three invited lectures on methods for quantum algorithms at the Thirteenth Annual Canadian Summer School on Quantum Information (CSSQI), held at the Institute for Quantum Science and Technology (IQST) at the University of Calgary.

- For several years I organised the seminars for QSciTech (the Macquarie University research centre in quantum science). In 2015 I changed the format to the Quantum Frontiers seminar series, with seminars from prominent researchers from around Australia, such as Andrew Doherty, Peter Drummond, and Jon Dowling.

- I help with the Macquarie University open days, providing academic advising.

- In 2010 I acted as an examiner for a PhD thesis for the University of Adelaide.

- In 2016 acted as a PhD thesis examiner for the University of Western Australia.

- In the first semester of 2007 I organised problem solving sessions on quantum information.

- I frequently referee for many journals, and in 2013 was selected as an outstanding referee by the American Physical Society (http://journals.aps.org/OutstandingReferees). As a referee I proposed the idea of using a linear spin chain for quantum communication, rather than a ring as originally proposed. Journals I have refereed for include:
  - ▷ Nature & Nature Photonics
  - ▷ PRX Quantum, Physical Review Letters & Physical Review A
  - ▷ Communications in Mathematical Physics
  - ▷ Quantum Information and Computation
  - ▷ IEEE Transactions on Information Theory

- ▷ Journal of the Optical Society of America B
- ▷ Journal of Physics A & B
- ▷ New Journal of Physics
- ▷ Physics Letters A
- ▷ Optics Communications
- ▷ International Journal of Quantum Information

Teaching Experience

My teaching experience is up to S1 2022, and from S2 2022 to 2026 I have a Google sponsored research agreement with no teaching load.

2022

- PHYS7905 Quantum Information and Computation, MRes/PhD S1, 25 students
  Role: I am a lecturer, covering the material in the first half of the unit. This subject is for MRes students as well as students who are part of the Sydney Quantum Academy (SQA), and the majority of the students are external students from other universities from the SQA.
- PHYS3810 Professional Physics, Third year
  Role: I helped organise the student placements for this second semester unit in S1.

2021

- PHYS2910/3910 Advanced Physics II/III, Second/Third year S2, 15 students
  Role: I am running the second semester part of this full-year unit for Advanced Physics students.
- PHYS7905/8905 Quantum Information and Computation, MRes/PhD S1, 17 students
  Role: Lecturer; in 2021 I developed a significant amount of new material covering introductory quantum information concepts other than quantum algorithms. This is because quantum algorithms are covered in a different SQA unit.
- PHYS3810 Professional Physics, Third year
  Role: I helped organise the student placements for this second semester unit in S1.

2020

- PHYS2910/3910 Advanced Physics II/III, Second/Third year S2, 20 students
  Role: I am running the second semester part of this full-year unit for Advanced Physics students.
- PHYS3130 Quantum Mechanics and Atomic Physics, Third year S1, 25 students
  Role: This is the equivalent subject to PHYS303 in 2017-2019. This year I am a lecturer.
- PHYS7905/8905 Quantum Information and Computation, MRes/PhD S1, 5 students
  Role: This subject is PHYS7905 for MRes students, and PHYS8905 for PhD students who are part of the Sydney Quantum Academy. It is the equivalent subject to PHYS714 in previous years. This year I am a lecturer.
- PHYS3810 Professional Physics, Third year
  Role: I helped organise the student placements for this second semester unit in S1. This is the same unit as PHYS311 in previous years.

2019

- PHYS311 Professional Physics, Third year S2, 17 students
  Role: I helped to start this new subject, which is a PACE and capstone unit. This year I am convenor, so organise the student placements, as well as the workshops and oral presentations.
- ASTR378 General Relativity, Third year S2, 16 students
  Role: convenor

- PHYS303 Quantum Mechanics and Atomic Physics, Third year S1, 20 students
  Role: convenor
- PHYS701 Mathematical Methods in Physics, MRes S1, 6 students
  Role: I teach the component of the course on differential equations, as well as the Mathematica labs. I originally started teaching this subject in 2008, and wrote extensive notes. Each year I have made further improvements to these notes, based on the student feedback. In the TEDS surveys the students have particularly noted how helpful the notes are. This course is on mathematical methods in physics, and the course is organised so each lecture is followed by a tutorial. This helps the students to quickly gain experience in applying the techniques taught in the lectures.

2018

- ASTR378 General Relativity, Third year, S2, 19 students
  Role: lecturer
- PHYS714 Quantum Information and Technology, MRes, S2, 4 students
  Role: convenor
- PHYS311 Professional Physics, Third year, S2, 22 students
  Role: Running third workshop and oral presentations, supervising students in work placements.
- PHYS303 Quantum Mechanics and Atomic Physics, Third year S1, 32 students
  Role: convenor
- PHYS701 Mathematical Methods in Physics, MRes S1, 11 students
  Role: convenor

2017

- ASTR378 General Relativity, Third year, S2, 17 students
  Role: lecturer
- PHYS714 Quantum Information and Technology, MRes, S2, 2 students
  Role: convenor
- PHYS311 Professional Physics, Third year, S2, 16 students
  Role: This was the first year I taught this PACE unit. I supervised two pairs of students in work placements, ran the third workshop and organised the oral presentations.
- PHYS303 Quantum Mechanics and Atomic Physics, Third year, S1, 30 students
  Role: I was convenor for this new unit, and gave the lectures for the quantum mechanics component. The quantum mechanics component was previously part of PHS301.
- PHYS701 Mathematical Methods in Physics, MRes, S1, 3 students
  Role: convenor
- PHYS201 Classical and Quantum Oscillations and Waves, Second year, S1, 50 students
  Role: tutor for Python labs

2016

- ASTR378 General Relativity, Third year, S2, 20 students
  Role: I gave lectures in this unit for the first time. I prepared extensive notes for the subject, as well as preparing weekly tutorials, assignments, and the final exam.
- PHYS714 Quantum Information and Technology, MRes, S2, 4 students
  Role: I taught half the masters level course on quantum information for the first time. I gave lectures on the theoretical foundations of quantum information leading up to quantum algorithms. I also set projects for the students.
- PHYS301 Electromagnetism and Quantum Physics, Third year, S1, 28 students
  Role: I taught this unit for the first time. I was convenor, and gave the lectures for the quantum mechanics component.

- PHYS701 Mathematical Methods in Physics, MRes, S1, 6 students
  Role: convenor
- PHYS143 Physics IB, First year, S2, 281 students
  Role: tutor
- PHYS140 Physics IA, First year, S1, 217 students
  Role: tutor

2015
- PHYS701 Mathematical Methods in Physics, MRes, S1, 3 students
  Role: convenor
- PHYS143 Physics IB, First year, S1, 249 students
  Role: I ran tutorials and organised two junior tutors.

2014
- PHYS701 Mathematical Methods in Physics, MRes, S1, 5 students
  Role: convenor

2013
- PHYS701 Mathematical Methods in Physics, MRes, S1, 11 students
  Role: convenor

2012
- PHYS490 Physics honours full time, 7 students
  Role: I taught half of the Mathematical Methods component of the fourth year honours degree. Note that honours was a single unit.

2008
- PHYS490 Physics honours full time, 8 students
  Role: I taught half of the Mathematical Methods component of the fourth year honours degree for the first time. I wrote a large set of lecture notes, of more than 60 pages. I set assignments and one half of the exam.

2007
- PHYS490 Physics honours full time, 4 students
  Role: I gave lectures and set assignment questions for the quantum information part of the fourth year honours unit.

2003
- PHYS490 Physics honours full time, 2 students
  Role: I taught a component of the fourth year honours unit at Macquarie University in 2003. I gave a series of lectures on Fourier analysis, set assignments and set an exam question.

2002
- PHYS480 Physics honours, 3 students
  Role: I gave a lecture on quantum algorithms as part of the honours unit at Macquarie University in 2002.

2001
- I was a Tutorial Assistant at the University of Queensland in 1999-2001, and organised the laboratory component of a course on engineering physics. I wrote the laboratory manual, organised tutors to supervise the experiments and supervised experiments myself. The laboratory manual I wrote was still in use several years later.

Supervision Experience

Kaur Kristjuhan
Enrolled April 2024 – Present
Kaur is a PhD student jointly supervised with the company Molecular Quantum Solutions. He is performing research into improved methods for unitary synthesis and state preparation.

Abhishek Rawat
Enrolled January 2024 – Present

Abhishek is a PhD student performing research into improved quantum algorithms for simulation using product formulae.

Agastya Kapur
Enrolled July 2024 – Present
Agastya is a Master of Research student who is jointly supervised with CSIRO, and performing research into quantum machine learning for astronomy applications (detecting fast radio bursts).

Philipp Schleich
Enrolled September 2022 – 2023
Philipp Schleich was doing a Cotutelle between Macquarie and University of Toronto with Alán Aspuru-Guzik. His project was on how to simulate differential equations on quantum computers. We showed how to use rescaling and higher-order discretisation in quantum algorithms to more effectively solve nonlinear partial differential equations, and this work has just been accepted by npj Quantum Information [5].

Mauricio Morales
Enrolled April 2020 – August 2023
Mauricio (Mauro) Morales was a student jointly supervised with Michael Bremner at UTS. His project was on how to derive higher-order product formulae for Hamiltonian simulation. This work culminated in our publication [7], which presented 8th order product formulae that are orders of magnitude more accurate than anything from prior work. He is now a QuICS Hartree Postdoctoral Fellow at University of Maryland, and lead author on our recent review article "Quantum linear system solvers: A survey of algorithms and applications".

Mária Kieferová
Enrolled 29 May 2017 – June 2019
I supervised the Cotutelle student Mária Kieferová in a project on quantum algorithms. She is now a lecturer and Sydney Quantum Academy fellow at UTS.

1. She has developed methods for performing quantum simulation of time-dependent Hamiltonians with exponential precision, and this work is published in Physical Review A [32].

2. She developed methods for preparing antisymmetrised states for quantum simulation of fermions [38].

3. She helped write the review article "Quantum chemistry in the age of quantum computing" which was published in Chemical Reviews.

4. She has developed techniques for implementing quantum algorithms for solving linear systems of equations using quantum signal processing with two qubits. She tested this algorithm online on the Rigetti quantum processor.

Zixin Huang
In 2017 I was an auxiliary supervisor for the University of Sydney student **Zixin Huang**. I supervised her in a project on quantum phase estimation which led to a publication in Physical Review A [45]. Following her PhD she worked in the group of Pieter Kok at Univerrsity of Sheffield. In 2021 was awarded a Sydney Quantum Academy fellowship at Macquarie, followed by a DECRA in 2022. In 2025 she was awarded a Vice-Chancellor's Fellowship at RMIT University, and is taking a permanent position as Senior Lecturer.

Hossein Tavakoli Dinani
Enrolled 13 September 2012 – 14 March 2016, Graduation 20 September, 2016
Following graduation he won a CONICYT fellowship at Pontificia Universidad Católica de Chile. At the beginning of his PhD candidature I taught him how to perform CUDA parallel

programming for GPUs, and he performed advanced research in quantum metrology using CUDA. I guided him through multiple sub-projects, which resulted in three publications, and three presentations at conferences.

1. One sub-project, which has results published in Physical Review A [57], is on methods for creating loss-resistant states and performing adaptive measurements with multiple states. He presented this work at the AIP Congress in 2014, and QIPC 2013.

2. He has shown how to use swarm optimisation for NV centre magnetometry, and we have collaborated with researchers at Delft University of Technology to achieve experimental demonstration. This work was published in Nature Nanotechnology [52].

3. He determined optimal states for metrology where both the loss and phase information are used to estimate a transition frequency. This work was published in Physical Review A [50], and he presented the work at CLEO/Europe. This work is in collaboration with Jonathan Dowling.

4. He examined methods of adaptive measurements with squeezed states for phase variation with a range of spectra. This work appeared in Physical Review A [42].

Teaching Training

- In 2017 I participated in the HDR Supervision Enhancement Program (SEP) workshop "Thesis by Publication".

- In 2016 I participated in the HDR SEP workshop "Doctoral supervision in virtual spaces".

- In 2015 I participated in the LTC workshop SEP Update: Examining a Thesis. This was primarily to learn about the examination process, and what makes an excellent thesis, as my PhD student was about to begin writing his thesis. It was also because I have previously examined a thesis, and the requirements for assessment were not made clear.

- In 2014 I attended the LTC Workshop – How to 'Flip' your Classroom and Encourage Active Learning. I was motivated to attend this course by issues that were raised in the FILT course, about ways to encourage active learning. I attended this workshop to learn more about the flipped classroom model, which may be a useful way of encouraging active learning. Based on the course I decided that it may be very time consuming to organise, and the advantage for teaching Physics is not clear. Therefore I am not currently planning to use this method, but am keeping it in mind for the future.

- In 2013 I completed the course Foundations in Learning and Teaching (FILT), a comprehensive 5-day course that explores many aspects of teaching practice. As part of this I attended a lecture from one of my colleagues (Alexei Gilchrist), and took notes of his methods to further enhance my teaching practice. I also had him attend some of my lectures, and give feedback. I wrote a detailed FILT reflection, analysing what I had learnt from this exercise, as well as synthesising what I had learnt from the course, and examining my professional development needs.

- In 2012 I attended the HDR SEP Initial Workshop. That was when I started supervising my PhD student, Hossein Dinani, so this workshop helped me to learn effective ways to get him started on the project. In addition, I was interested to discuss how to strike the right balance between giving students help, and allowing them to develop as an independent researcher.

- In 2014 I attended the LTC workshop SEP Update: Supervising to Completion. This was because my PhD student Hossein Dinani was completing in 2016. In this workshop I learnt about techniques for managing completion of his project to ensure that he completes successfully.