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School of Mathematical and Physical Sciences  
ARC Centre of Excellence for Engineered Quantum Systems (EQuS)  
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## Biography

Director Macquarie Centre for Quantum Engineering (MQCQE)  
Chief Investigator ARC Centre for Excellence in Engineered Quantum Systems (EQUIS)  
Executive Board Member Sydney Quantum Academy (SQA)

## Employment

### Professor in QIS (Core)

Professor  
School of Mathematical and Physical Sciences  
Macquarie University  
1 Jan 2022 → present

### ARC Centre of Excellence for Engineered Quantum Systems (EQuS)

Macquarie University  
1 Jan 2011 → present

### Macquarie University Research Centre in Quantum Science and Technology

Macquarie University  
1 Jan 2009 → present

### Future Communications Research Centre

Macquarie University  
1 Jan 2023 → 31 Dec 2027

## Research outputs

### Information flow in non-unitary quantum cellular automata

Wagner, E., Nigmatullin, R., Gilchrist, A. & Brennen, G. K., 17 Jan 2024, In: SciPost Physics. 16, 1, p. 1-41 41 p., 014.

### Scale limited fields and the Casimir effect

Vedl, Š., George, D. J. & Brennen, G. K., 1 Jan 2024, In: Physical Review D: covering particles, fields, gravitation, and cosmology. 109, 1, p. 016018-1-016018-10 10 p., 016018.

### Proof-of-work consensus by quantum sampling

Singh, D., Fu, B., Muraleedharan, G., Cheng, C-M., Newton, N. R., Rohde, P. P. & Brennen, G. K., 31 May 2023, (Submitted) arXiv.org, 21 p. (arXiv).

### Imaging stars with quantum error correction

Huang, Z., Brennen, G. K. & Ouyang, Y., 18 Nov 2022, In: Physical Review Letters. 129, 21, p. 210502-1-210502-6 6 p., 210502.

### Entanglement in quantum field theory via wavelet representations

George, D. J., Sanders, Y. R., Bagherimehrab, M., Sanders, B. C. & Brennen, G. K., 26 Aug 2022, In: Physical Review D: covering particles, fields, gravitation, and cosmology. 106, 3, p. 036025-1-036025-19 19 p., 036025.

**Nearly optimal quantum algorithm for generating the ground state of a free quantum field theory**

Bagherimehrab, M., Sanders, Y. R., Berry, D. W., Brennen, G. K. & Sanders, B. C., 28 Jun 2022, In: PRX Quantum. 3, 2, p. 020364-1-020364-66 66 p., 020364.

**Information flow in one-dimensional non-unitary quantum cellular automata**

Wagner, E., Nigmatullin, R., Gilchrist, A. & Brennen, G., 21 Apr 2022, (Submitted) arXiv.org, 21 p. (arXiv).

**Imaging stars with quantum error correction**

Huang, Z., Brennen, G. K. & Ouyang, Y., 12 Apr 2022, (Submitted) arXiv.org, 8 p. (arXiv).

**Modified coherence of quantum spins in a damped pure-dephasing model**

Johnsson, M. T., Baragiola, B. Q., Volz, T. & Brennen, G. K., 1 Mar 2022, In: Physical Review B: covering condensed matter and materials physics. 105, 9, p. 094308-1-094308-15 15 p., 094308.

**Entanglement in quantum field theory via wavelet representations**

Brennen, G., 17 Jan 2022, (Submitted) arXiv.org, (arXiv).

**Directed percolation in nonunitary quantum cellular automata**

Nigmatullin, R., Wagner, E. & Brennen, G., 10 Dec 2021, In: Physical Review Research. 3, 4, p. 043167-1-043167-10 10 p., 043167.

**Australia should invest in a home-grown quantum industry**

Brennen, G. & Rohde, P., 1 Nov 2021, The Strategist.

**An Australian strategy for the quantum revolution**

Brennen, G., Devitt, S., Roberson, T. & Rohde, P., 5 May 2021, Barton, ACT: Australian Strategic Policy Institute (ASPI). 32 p. (Policy Brief (The Australian Strategic Policy Institute); no. 43/2021)

**Decoding holographic codes with an integer optimization decoder**

Harris, R. J., Coupe, E., McMahon, N., Brennen, G. & Stace, T. M., 21 Dec 2020, In: Physical Review A: covering atomic, molecular, and optical physics and quantum information. 102, 6, p. 062417-1-062417-6 6 p., 062417.

**Geometric pathway to scalable quantum sensing**

Johnsson, M. T., Mukty, N. R., Burgarth, D., Volz, T. & Brennen, G. K., 6 Nov 2020, In: Physical Review Letters. 125, 19, p. 190403-1-190403-6 6 p., 190403.

**A holographic duality from lifted tensor networks**

McMahon, N., Singh, S. & Brennen, G., 24 Apr 2020, In: npj quantum information. 6, p. 1-13 13 p., 36.

**Ensemble-induced strong light-matter coupling of a single quantum emitter**

Schütz, S., Schachenmayer, J., Hagenmüller, D., Brennen, G. K., Volz, T., Sandoghdar, V., Ebbesen, T. W., Genes, C. & Pupillo, G., 20 Mar 2020, In: Physical Review Letters. 124, 11, p. 1-7 7 p., 113602.

**Unitary and nonunitary quantum cellular automata with Rydberg arrays**

Wintermantel, T. M., Wang, Y., Lochead, G., Shevate, S., Brennen, G. K. & Whitlock, S., 21 Feb 2020, In: Physical Review Letters. 124, 7, p. 1-7 7 p., 070503.

**Entanglement renormalization and symmetry fractionalization**

Singh, S., McMahon, N. A. & Brennen, G. K., 22 May 2019, In: Physical Review B. 99, 19, p. 1-10 10 p., 195139.

**Calderbank-Shor-Steane holographic quantum error-correcting codes**

Harris, R. J., McMahon, N., Brennen, G. K. & Stace, T. M., 1 Nov 2018, In: Physical Review A - Atomic, Molecular, and Optical Physics. 98, 5, p. 1-6 6 p., 052301.

**Quantum attacks on Bitcoin, and how to protect against them**

Aggarwal, D., Brennen, G., Lee, T., Santha, M. & Tomamichel, M., 10 Oct 2018, In: *Ledger*. 3, p. 68-90 23 p.

**Phase transitions on a ladder of braided non-Abelian anyons**

Ayeni, B. M., Pfeifer, R. N. C. & Brennen, G. K., 30 Jul 2018, In: *Physical Review B*. 98, 4, p. 1-14 14 p., 045432.

**Anonymous broadcasting of classical information with a continuous-variable topological quantum code**

Menicucci, N. C., Baragiola, B. Q., Demarie, T. F. & Brennen, G. K., 30 Mar 2018, In: *Physical Review A*. 97, 3, p. 1-21 21 p., 032345.

**Holographic spin networks from tensor network states**

Singh, S., McMahon, N. A. & Brennen, G. K., 26 Jan 2018, In: *Physical Review D: covering particles, fields, gravitation, and cosmology*. 97, 2, p. 1-22 22 p., 026013.

**Relational time in anyonic systems**

Nikolova, A., Brennen, G. K., Osborne, T. J., Milburn, G. J. & Stace, T. M., 2018, In: *Physical Review A*. 97, 3, p. 1-5 5 p., 030101(R).

**Robust symmetry-protected metrology with the Haldane phase**

Bartlett, S. D., Brennen, G. K. & Miyake, A., 2018, In: *Quantum Science and Technology*. 3, 1, p. 1-7 7 p., 014010.

**Room-temperature spontaneous superradiance from single diamond nanocrystals**

Bradac, C., Johnsson, M. T., Breugel, M. V., Baragiola, B. Q., Martin, R., Juan, M. L., Brennen, G. K. & Volz, T., 31 Oct 2017, In: *Nature Communications*. 8, 1, p. 1-6 6 p., 1205.

**Cooperative effects between color centers in diamond: applications to optical tweezers and optomechanics**

Bradac, C., Prasanna Venkatesh, B., Besga, B., Johnsson, M., Brennen, G., Molina-Terriza, G., Volz, T. & Juan, M. L., 1 Jan 2017, *Optical Trapping and Optical Micromanipulation XIV*. Dholakia, K. & Spalding, G. C. (eds.). Bellingham, Washington: SPIE, p. 103471I-1-103471I-5 5 p. 103471I. (Proceedings of SPIE; vol. 10347).

**Cooperatively enhanced dipole forces from artificial atoms in trapped nanodiamonds**

Juan, M. L., Bradac, C., Besga, B., Johnsson, M., Brennen, G., Molina-Terriza, G. & Volz, T., 2017, In: *Nature Physics*. 13, 3, p. 241–245 5 p.

**Loops and strings in a superconducting lattice gauge simulator**

Brennen, G. K., Pupillo, G., Rico, E., Stace, T. M. & Vodola, D., 7 Dec 2016, In: *Physical Review Letters*. 117, 24, p. 1-7 7 p., 240504.

**Macroscopic superpositions and gravimetry with quantum magnetomechanics**

Johnsson, M. T., Brennen, G. K. & Twamley, J., 21 Nov 2016, In: *Scientific Reports*. 6, p. 1-13 13 p., 37495.

**Simulation of braiding anyons using matrix product states**

Ayeni, M., Singh, S., Pfeifer, R. N. C. & Brennen, G. K., 20 Apr 2016, In: *Physical Review B: Condensed Matter and Materials Physics*. 93, 16, p. 1-18 18 p., 165128.

**Cooperatively-enhanced atomic dipole forces in optically trapped nanodiamonds containing NV centres, in liquid**

Bradac, C., Juan, M. L., Johnsson, M., Besga, B., van Breugel, M., Baragiola, B., Martin, R., Brennen, G., Molina-Terriza, G. & Volz, T., 2016, *SPIE BioPhotonics Australasia*. Hutchinson, M. R. & Goldys, E. M. (eds.). S.I.: SPIE, Vol. 10013. p. 1-1 1 p. 1001334

**Multiscale quantum simulation of quantum field theory using wavelets**

Brennen, G. K., Rohde, P., Sanders, B. C. & Singh, S., 15 Sept 2015, In: *Physical Review A - Atomic, Molecular, and Optical Physics*. 92, 3, p. 1-11 11 p., 032315.

**Focus on Quantum Memory**

Brennen, G., Giacobino, E. & Simon, C., 6 May 2015, In: New Journal of Physics. 17, p. 1-3 3 p., 050201.

**Transport properties of anyons in random topological environments**

Zatloukal, V., Lehman, L., Singh, S., Pachos, J. K. & Brennen, G. K., 9 Oct 2014, In: Physical Review B: Condensed Matter and Materials Physics. 90, 13, p. 134201-1-134201-9 9 p., 134201.

**Detecting topological entanglement entropy in a lattice of quantum harmonic oscillators**

Demarie, T. F., Linjordet, T., Menicucci, N. C. & Brennen, G. K., 26 Aug 2014, In: New Journal of Physics. 16, p. 1-30 30 p., 085011.

**Matrix product states for anyonic systems and efficient simulation of dynamics**

Singh, S., Pfeifer, R. N. C., Vidal, G. & Brennen, G. K., 13 Feb 2014, In: Physical Review B: Condensed Matter and Materials Physics. 89, 7, p. 075112-1-075112-16 16 p., 075112.

**Low depth quantum circuits for Ising models**

Iblisdir, S., Cirio, M., Boada, O. & Brennen, G. K., Jan 2014, In: Annals of Physics. 340, 1, p. 205-251 47 p.

**Quantum walks of  $SU(2)^k$  anyons on a ladder**

Lehman, L., Ellinas, D. & Brennen, G. K., Jul 2013, In: Journal of Computational and Theoretical Nanoscience. 10, 7, p. 1634-1643 10 p.

**Quantum walks with memory provided by recycled coins and a memory of the coin-flip history**

Rohde, P. P., Brennen, G. K. & Gilchrist, A., 2 May 2013, In: Physical Review A - Atomic, Molecular, and Optical Physics. 87, 5, p. 1-11 11 p., 052302.

**Holonomic quantum computing in symmetry-protected ground states of spin chains**

Renes, J. M., Miyake, A., Brennen, G. K. & Bartlett, S. D., Feb 2013, In: New Journal of Physics. 15, p. 1-17 17 p., 025020.

**Deterministic generation of an on-demand photon fock state from a solid-state system**

Xia, K., Brennen, G. K., Ellinas, D. & Twamley, J., 2013, *Proceedings of the 2013 Conference on Lasers and Electro-Optics, CLEO 2013: OSA Technical Digest (online)*. Washington, D.C.: OSA Publishing, p. 1-2 2 p. QM2C.2

**Deterministic generation of an on-demand Fock state**

Xia, K., Brennen, G. K., Ellinas, D. & Twamley, J., 19 Nov 2012, In: Optics Express. 20, 24, p. 27198-27211 14 p.

**Quantum magnetomechanics: ultrahigh-Q-levitated mechanical oscillators**

Cirio, M., Brennen, G. K. & Twamley, J., 5 Oct 2012, In: Physical Review Letters. 109, 14, p. 1-5 5 p., 147206.

**Measurement-based quantum computation in a two-dimensional phase of matter**

Darmawan, A. S., Brennen, G. K. & Bartlett, S. D., 13 Jan 2012, In: New Journal of Physics. 14, p. 1-14 14 p., 013023.

**Braiding interactions in anyonic quantum walks**

Lehman, L. J., Zatloukal, V., Pachos, J. K. & Brennen, G. K., 2012, In: Quantum computers and computing. 12, 1, p. 51-62 12 p.

**Quantum walks with non-abelian anyons**

Lehman, L., Zatloukal, V., Brennen, G. K., Pachos, J. K. & Wang, Z., 10 Jun 2011, In: Physical Review Letters. 106, 23, p. 1-4 4 p., 230404.

**Bulk fault-tolerant quantum information processing with boundary addressability**

Paz-Silva, G. A., Brennen, G. K. & Twamley, J., Jan 2011, In: New Journal of Physics. 13, p. 1-18 18 p., 013011.

**Quantum computational renormalization in the haldane phase**

Bartlett, S. D., Brennen, G. K., Miyake, A. & Renes, J. M., 10 Sept 2010, In: Physical Review Letters. 105, 11, p. 1-4 4 p., 110502.

**Fault tolerance with noisy and slow measurements and preparation**

Paz-Silva, G. A., Brennen, G. K. & Twamley, J., 30 Aug 2010, In: Physical Review Letters. 105, 10, p. 1-4 4 p., 100501.

**Non-Abelian anyonic interferometry with a multi-photon spin lattice simulator**

Berry, D. W., Aguado, M., Gilchrist, A. & Brennen, G. K., 7 May 2010, In: New Journal of Physics. 12, p. 1-22 22 p., 053011.

**Anyonic quantum walks**

Brennen, G. K., Ellinas, D., Kendon, V., Pachos, J. K., Tsohantjis, I. & Wang, Z., Mar 2010, In: Annals of Physics. 325, 3, p. 664-681 18 p.

**Globally controlled universal quantum computation with arbitrary subsystem dimension**

Paz-Silva, G. A., Brennen, G. K. & Twamley, J., 12 Nov 2009, In: Physical Review A - Atomic, Molecular, and Optical Physics. 80, 5, p. 1-8 8 p., 052318.

**Non-locality of non-Abelian anyons**

Brennen, G. K., Lblisdir, S., Pachos, J. K. & Slingerland, J. K., 12 Oct 2009, In: New Journal of Physics. 11, p. 1-18 18 p., 103023.

**Constructing general unitary maps from state preparations**

Merkel, S. T., Brennen, G., Jessen, P. S. & Deutsch, I. H., 28 Aug 2009, In: Physical Review A - Atomic, Molecular, and Optical Physics. 80, 2, p. 1-8 8 p., 023424.

**Simulations of quantum double models**

Brennen, G. K., Aguado, M. & Cirac, J. I., 22 May 2009, In: New Journal of Physics. 11, p. 1-33 33 p., 053009.

**Creation, manipulation, and detection of abelian and non-abelian anyons in optical lattices**

Aguado, M., Brennen, G. K., Verstraete, F. & Cirac, J. I., 22 Dec 2008, In: Physical Review Letters. 101, 26, p. 1-4 4 p., 260501.

**Quantum control of a trapped electron spin in a quantum dot using photon polarization**

Dubin, F., Combescot, M., Brennen, G. K. & Melet, R., 21 Nov 2008, In: Physical Review Letters. 101, 21, p. 1-4 4 p., 217403.

**Measurement-based quantum computer in the gapped ground state of a two-body hamiltonian**

Brennen, G. K. & Miyake, A., 2 Jul 2008, In: Physical Review Letters. 101, 1, p. 1-4 4 p., 010502.

**Anyonic interferometry and protected memories in atomic spin lattices**

Jiang, L., Brennen, G. K., Gorshkov, A. V., Hammerer, K., Hafezi, M., Demler, E., Lukin, M. D. & Zoller, P., Jun 2008, In: Nature Physics. 4, 6, p. 482-488 7 p.

**General depolarized pure states: Identification and properties**

Byrd, M. S. & Brennen, G. K., Mar 2008, In: Physics Letters. Section A: General, Atomic and Solid State Physics. 372, 11, p. 1770-1782 13 p.

**Why should anyone care about computing with anyons?**

Brennen, G. K. & Pachos, J. K., 8 Jan 2008, In: Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences. 464, 2089, p. 1-24 24 p.

Designing spin-1 lattice models using polar molecules

Brennen, G. K., Micheli, A. & Zoller, P., 18 May 2007, In: *New Journal of Physics*. 9, p. 1-34 34 p., 138.

Qudit surface codes and gauge theory with finite cyclic groups

Bullock, S. S. & Brennen, G. K., 30 Mar 2007, In: *Journal of Physics A: Mathematical and Theoretical*. 40, 13, p. 3481-3505 25 p.

Efficient circuits for exact-universal computation with qudits

Brennen, G. K., Bullock, S. S. & O'Leary, D. P., Jul 2006, In: *Quantum Information and Computation*. 6, 4-5, p. 436-454 19 p.

#### **A toolbox for lattice-spin models with polar molecules**

Micheli, A., Brennen, G. K. & Zoller, P., 17 May 2006, In: *Nature Physics*. 2, 5, p. 341-347 7 p.

Parallelism for quantum computation with qudits

O'Leary, D. P., Brennen, G. K. & Bullock, S. S., 2006, In: *Physical Review A - Atomic, Molecular, and Optical Physics*. 74, 3, p. 1-11 11 p., 032334.

Asymptotically optimal quantum circuits for d-level systems

Bullock, S. S., O'Leary, D. P. & Brennen, G. K., 17 Jun 2005, In: *Physical Review Letters*. 94, 23, p. 1-4 4 p., 230502.

Scalable register initialization for quantum computing in an optical lattice

Brennen, G. K., Pupillo, G., Rey, A. M., Clark, C. W. & Williams, C. J., 14 Jun 2005, In: *Journal of Physics B: Atomic, Molecular and Optical Physics*. 38, 11, p. 1687-1694 8 p.

Time reversal and n-qubit canonical decompositions

Bullock, S. S., Brennen, G. K. & O'Leary, D. P., Jun 2005, In: *Journal of Mathematical Physics*. 46, 6, p. 1-19 19 p., 062104.

Criteria for exact qudit universality

Brennen, G. K., O'Leary, D. P. & Bullock, S. S., May 2005, In: *Physical Review A - Atomic, Molecular, and Optical Physics*. 71, 5, p. 1-7 7 p., 052318.

Scalable quantum computation in systems with Bose-Hubbard dynamics

Pupillo, G., Rey, A. M., Brennen, G., Williams, C. J. & Clark, C. W., 10 Nov 2004, In: *Journal of Modern Optics*. 51, 16-18, p. 2395-2404 10 p.

Stability of global entanglement in thermal states of spin chains

Brennen, G. K. & Bullock, S. S., Nov 2004, In: *Physical Review A - Atomic, Molecular, and Optical Physics*. 70, 5, p. 052303-1-052303-12 12 p., 052303.

Canonical decompositions of n-qubit quantum computations and concurrence

Bullock, S. S. & Brennen, G. K., Jun 2004, In: *Journal of Mathematical Physics*. 45, 6, p. 2447-2467 21 p.

Characterizing the entangling capacity of n-qubit computations

Bullock, S. S. & Brennen, G. K., 2004, In: *Proceedings of SPIE - The International Society for Optical Engineering*. 5436, p. 127-136 10 p.

An observable measure of entanglement for pure states of multi-qubit systems

Brennen, G. K., Nov 2003, In: *Quantum Information and Computation*. 3, 6, p. 619-626 8 p.

Entanglement dynamics in one-dimensional quantum cellular automata  
Brennen, G. K. & Williams, J. E., Oct 2003, In: *Physical Review A - Atomic, Molecular, and Optical Physics*. 68, 4 A, p. 1-12 12 p., 042311.

#### **A scalable quantum architecture using efficient nonlocal interactions**

Brennen, GK., Song, D. H. & Williams, CJ., 2003, *Proceedings of the Sixth International Conference on Quantum Communication, Measurement and Computing*. Shapiro, J. H. & Hirota, O. (eds.). Princeton, NJ: Rinton Press Inc., p. 201-204 4 p.

#### **Quantum-computer architecture using nonlocal interactions**

Brennen, G. K., Song, D. & Williams, C. J., 2003, In: *Physical Review A - Atomic, Molecular, and Optical Physics*. 67, 5, p. 1-4 4 p., 050302.

#### **Quantum logic for trapped atoms via molecular hyperfine interactions**

Brennen, G. K., Deutsch, I. H. & Williams, C. J., Feb 2002, In: *Physical Review A - Atomic, Molecular, and Optical Physics*. 65, 2, p. 1-9 9 p., 022313.

#### **Quantum control and information processing in optical lattices**

Jessen, P. S., Haycock, D. L., Klose, G., Smith, G. A., Deutsch, I. H. & Brennen, G., Dec 2001, In: *Quantum Information and Computation*. 1, SUPPL. 1, p. 20-32 13 p.

#### **Entangling dipole-dipole interactions in optical lattices**

Brennen, G. K., Deutsch, I. H. & Jessen, P. S., May 2001, *Technical Digest - Summaries of Papers Presented at the Quantum Electronics and Laser Science Conference, QELS 2001*. Piscataway, N.J.: Institute of Electrical and Electronics Engineers (IEEE), p. 161-162 2 p. 962008

#### **Quantum control and entanglement engineering with cold trapped atoms**

Jessen, P. S., Haycock, D. L., Klose, G., Deutsch, I. H. & Brennen, G., 2001, *Proceedings of the 1st International Conference on Experimental Implementation of Quantum Computation*. Clark, R. G. (ed.). New Jersey, USA: Rinton Press Inc., p. 235-243 9 p.

#### **Quantum information processing in optical lattices**

Brennen, G., Deutsch, I. H. & Jessen, P. S., 2001, *Proceedings of the 1st International Conference on Experimental Implementation of Quantum Computation*. Clark, R. G. (ed.). Paramus, NJ: Rinton Press Inc., p. 249-256 8 p.

#### **Entangling dipole-dipole interactions for quantum logic in optical lattices**

Brennen, G. K. & Deutsch, I. H., 2000, In: *Conference on Quantum Electronics and Laser Science (QELS) - Technical Digest Series*. p. 149-150 2 p.

#### **Entangling dipole-dipole interactions for quantum logic with neutral atoms**

Brennen, G. K., Deutsch, I. H. & Jessen, P. S., 2000, In: *Physical Review A - Atomic, Molecular, and Optical Physics*. 61, 6, p. 1-10 10 p.

#### **Quantum computing with neutral atoms in an optical lattice**

Deutsch, I. H., Brennen, G. K. & Jessen, P. S., 2000, In: *Fortschritte der Physik*. 48, 9-11, p. 925-943 19 p.

#### **Quantum Logic Gates in Optical Lattices**

Brennen, G. K., Caves, C. M., Jessen, P. S. & Deutsch, I. H., 1 Feb 1999, In: *Physical Review Letters*. 82, 5, p. 1060-1063 4 p.

#### **Controlling atom-atom interactions in optical lattices**

Brennen, G. K., Caves, C. M., Deutsch, I. H. & Jessen, P. S., 1999, *QELS 1999: Quantum Electronics and Laser Science Conference*. Baltimore, Maryland: Optica Publishing Group (formerly OSA), 2 p. QTuM6. (IQEC, International Quantum Electronics Conference Proceedings).

Quantum logic gates with neutral atoms in an optical lattice  
Brennen, G., Caves, C. M., Deutsch, I. H. & Hughes, R. J., May 1998, *International Quantum Electronics Conference*. Washington, DC: OSA Publishing, p. 1-2 2 p. QMF3

## Press/Media

### A New Quantum Technique Could Change How We Study The Universe

Gavin Brennen

29/05/22

1 item of Media coverage

### NEW TECHNIQUE INTRODUCING FOREIGN ATOMS IN OPTICAL TRAPPING ALLOWS GREATER MANIPULATION OF NANOPARTICLES

Gavin Brennen

15/11/16 → 26/12/16

2 items of Media coverage

### New white paper maps the very real risks that quantum attacks will pose for Bitcoin

Gavin Brennen

1/11/17 → 9/11/17

9 items of Media coverage

### Quantum breakthrough could lead to planet-sized telescopes

Gavin Brennen

31/05/22

1 item of Media coverage

### Quantum computers could slash the energy use of cryptocurrencies

Gavin Brennen

20/06/23

1 item of Media coverage

### Quantum mass radar

Gavin Brennen

1/11/17

1 item of Media coverage

### TINY DIAMONDS LIGHT THE WAY FOR NEW QUANTUM TECHNOLOGIES

Gavin Brennen

31/10/17 → 1/11/17

2 items of Media coverage

## Awards

### Projects

#### AQUTE - Atomic Quantum Technologies

Brennen, G.

1/02/10 → 31/01/13

#### Australian Dark Matter Detector for High Mass Axions

Volz, T., Tobar, M., Goryachev, M., Ivanov, E., Fedorov, A., Bowen, W., Drinkwater, M., Brennen, G., Twamley, J., Altin, P., Doherty, A. & Rbyka, G.

**Engineered quantum matter: fundamentals and new technologies**

Brennen, G.

3/01/18 → ...

**SQA: Large Baseline Quantum Networks for Super-Resolution Imaging**

Brennen, G. & Huang, Z.

1/03/21 → 29/02/24

**Mid-level high performance computing (HPC) facility to increase the impact of theoretical output**

Steel, M., Wardle, M., Downes, J., Spence, D., Rabeau, J., Dawes, J., Pask, H., Twamley, J., Carman, R. & Brennen, G.  
1/01/09 → 31/12/09

**New particle physics on a table top: quantum braiding, quantum computing, and beyond**

Pfeifer, R. & Brennen, G.

16/06/14 → 7/10/16

**Quantum algorithms for computational physics**

Berry, D., Brennen, G., Childs, A., Pachos, J. K. & Aspuru-Guzik, A.

1/01/16 → 20/09/19

**Quantum limits on measurements in a universe with a minimum length scale**

Menicucci, N. C., Brennen, G. & Kempf, A.

23/03/20 → 22/03/23

**Quantum Science and Technology (QSciTech)**

Molina-Terriza, G., Twamley, J., Shparlinski, I., Town, G., Gilchrist, A., Brennen, G., Steel, M., Cresser, J., Rabeau, J., Terno, D., Brown, L., Bulger, D., Rebic, S. & Marshall, G.  
1/01/09 → 31/12/16

**SQA : SQA Career Development Fund - Round 4**

Brennen, G.

1/07/21 → 30/06/25

**Sydney Quantum Academy PhD Top-Up Scholarship\_Brennen/Wagner**

Brennen, G. & Wagner, E.

**Sydney Quantum Academy PhD Top-Up Scholarship\_Burgarth/Hahn**

Hahn, A., Burgarth, D. & Brennen, G.

1/03/20 → 31/03/24

**Sydney Quantum Academy Scholarship Brennen / Vedl**

Brennen, G.

1/10/22 → 30/09/26

**SQA Round 7: Sydney Quantum Academy successful SQA scholarships in Round 7 - Brennen/Gharat**

Brennen, G.

15/01/23 → 14/01/27

**ACQC: The Australian Centre for Quantum Growth (ACQC) Program: Quantum Australia**

Brennen, G., Dawes, J. & Reed, M.

**Topologically ordered quantum media: unveiling new physics in the collective**

Brennen, G.

1/01/13 → 30/06/13

**Understanding topological matter: A pathway to robust quantum computation**

Singh, S. & Brennen, G.

1/07/12 → 31/12/13