Peter P. **Rohde**

Quantum computer scientist · Theoretical physicist · Computer systems engineer · Music producer · Alpinist

Australia

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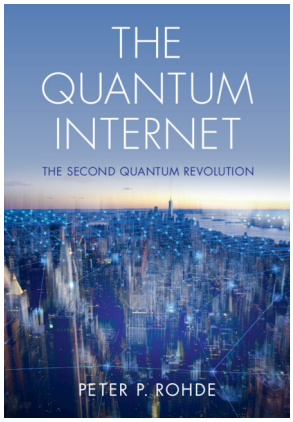
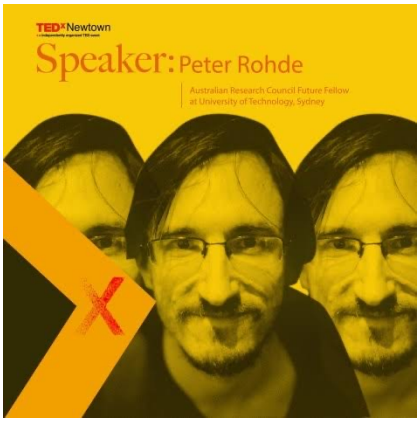
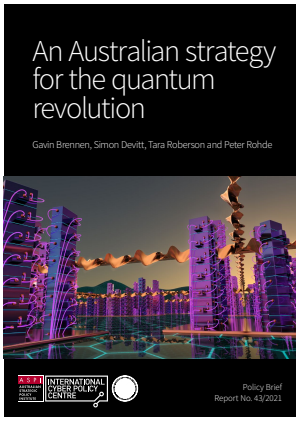
drpeterrohde | drpeterrohde | Peter Rohde | MoodSnap | drpeterrohde | Peter P. Rohde







Education

PhD in Quantum Computing

Brisbane, Australia

University of Queensland

2004-2007

- University of Queensland Postgraduate Research Scholarship
- Thesis: *Towards linear optics quantum computing*
- Supervisor: Prof. Timothy Ralph
- Academic visits: Max-Planck Institute for the Science of Light, Germany (Prof. Christine Silberhorn); Ultrafast Group at the University of Oxford, UK (Prof. Ian Walmsley); National Institute of Informatics, Japan (Prof. Kae Nemoto); Hewlett-Packard Labs, UK (Dr. William Munro)

Bachelor of Computer Systems Engineering (Hons I)

Brisbane, Australia

University of Queensland

2000-2003

- First Class Honours
- Grade Point Average: 6.6/7 (7 = High Distinction, 6 = Distinction)
- Dean's Commendations for High Achievement (semesters I-IV,VI-VIII)
- Thesis: *Non-idealised models for linear optics quantum computing*
- Supervisor: Prof. Timothy Ralph
- Specialisations: digital system design, computer architecture, signal & image processing, embedded systems, VLSI device physics & technology, semiconductor devices, operating systems, computer networks, electronics, modern physics & mathematics

Work History

2023-2024	**Senior Quantum Researcher**, BTQ	*Sydney, Australia*
2017-2020	**ARC Future Fellow**, Centre for Quantum Software & Information (QSI), University of Technology Sydney	*Sydney, Australia*
2016-2023	**Senior Lecturer**, Centre for Quantum Software & Information (QSI), University of Technology Sydney	*Sydney, Australia*
2016	**Lecturer**, Centre for Quantum Software & Information (QSI), University of Technology Sydney	*Sydney, Australia*
2015	**Postdoctoral Research Fellow**, Centre for Quantum Software & Information (QSI), University of Technology Sydney	*Sydney, Australia*
2011-2014	**Postdoctoral Research Fellow**, Centre of Excellence for Engineered Quantum Systems (EQuS), Macquarie University	*Sydney, Australia*
2011-2012	**Postdoctoral Research Fellow**, University of Paderborn	*Paderborn, Germany*
2010-2011	**Postdoctoral Research Fellow**, Centre for Quantum Computation & Communication Technology (CQC^2T), University of Queensland	*Brisbane, Australia*
2010-2010	**Postdoctoral Research Fellow**, Max-Planck Institute for the Science of Light	*Erlangen, Germany*
2009-2010	**Bioinformatician**, Institute for Molecular Biosciences (IMB), University of Queensland	*Brisbane, Australia*
2008-2009	**Software Engineer**, Andrew Corp.	*Wollongong, Australia*
2007-2008	**Postdoctoral Research Fellow**, Quantum Information Processing IRC, University of Oxford	*Oxford, UK*

Associate Positions

2023-2025 **Honorary Senior Lecturer**, Macquarie Centre for Quantum Engineering (MQCQE), Macquarie University *Sydney, Australia*
2021-2025 **Associate Investigator**, Center of Excellence for Engineered Quantum Systems (EQuS) *Brisbane, Australia*
2015-2025 **Associate Member**, Hearne Institute for Theoretical Physics, Louisiana State University *Louisiana, USA*

Academic Supervision

PhD graduates, 3
PhD candidates, 6
Masters graduates, 1
Honours graduates, 1
Masters candidates, 1
Engineering Graduate Projects, 32
Undergraduate research projects, 4
Interns, 8

Grants

Australian Research Council (ARC) Future Fellowship *Australia*

Peter P. Rohde *2017-2020*

- Title: *Secure quantum computing in a distributed world*
- Value: AU$652,000

United States National Science Foundation (NSF) *USA*

Jonathan P. Dowling & Peter P. Rohde *2014*

- Title: *The rise of the boson-sampling quantum computer and the renaissance of the linear optics quantum interferometer*
- Value: US$10,000

Mentoring

Humanitarian mentoring program, University of Technology Sydney *Sydney, Australia*
PhD mentoring program, ARC Centres of Excellence Mentoring Program *Sydney, Australia*
PhD mentoring program, Centre of Excellence for Engineered Quantum Systems (EQuS) *Sydney, Australia*
Fellowship mentoring program, University of Technology Sydney *Sydney, Australia*

Awards

1999 **Armidale Young Citizen of the Year**, jointly awarded for contributions to Armidale's youth by organising drug and alcohol free events *Armidale, Australia*
1999 **Dux**, University Admission Index 98.05%, Armidale High School *Armidale, Australia*
2002 **Emmanuel College Foundation Medal**, for contributions to the college community *Brisbane, Australia*
2004-2007 **Postgraduate Research Scholarship (UQPRS)**, University of Queensland *Brisbane, Australia*
2000-2003 **Dean's Commendations for High Achievement**, semesters I-IV,VI-VIII, University of Queensland *Brisbane, Australia*
St. Andrew Society of Scotland D. M. Fraser Bursary , for outstanding contribution to the College Community, Emmanuel College, University of Queensland *Brisbane, Australia*
2000-2003 **Golden Key Honours Society**, a society recognising academic excellence *Brisbane, Australia*
2001,2002 **College Scholarship for Academic Achievement**, Emmanuel College, University of Queensland *Brisbane, Australia*
2002 **College Prize for Academic Achievement with Distinction**, Emmanuel College, University of Queensland *Brisbane, Australia*
Emmanuel College Full Blue, for outstanding contribution to the college, Emmanuel College, University of Queensland *Brisbane, Australia*
2001,2002 **Principal's Prize for Meritorious Academic Achievement**, Emmanuel College, University of Queensland *Brisbane, Australia*

Scientific Outreach

Educational videos, *Introduction to Mathematica* ($\sim 45,000$ views), *Introduction to boson-sampling* ($\sim 5,500$ views), *The quantum internet: technology, economics & politics* (> 200 views)

2020 **The Quantum Internet**, QuBes Camp run by Q-munity

2020 **Toward a Quantum Internet**, Kitchener-Waterloo Quantum Technologies Enthusiasts

2020 **Quantum computing & quantum cryptography**, Q-munity,

2020 **Digital Liberty – In defence of cryptoanarchy**, Public event on digital rights

2020 **The barriers to medical cannabis in Australia**, Enpsychedelia, 3CR Radio

2019 **Are quantum computers the path to world peace?**, TEDxNewtown, Sydney, Australia

2019 **Why quantum physics is science, not witchcraft**, Science @ The Local, Blue Mountains, Australia

2019 **An introduction to quantum computing & why it'll be a part of your future**, Kenmore State High School, Brisbane, Australia

2019 **What's wrong with quantum mechanics?**, The Science Nation event for National Science Week, Sydney Maritime Museum, Sydney, Australia

2019 **Intro to quantum computing**, DSAI Special Edition @Microsoft Reactor, Sydney, Australia

2019 **For the love of science**, The Science Nation, Maritime Museum, Sydney, Australia

2018 **Greatest discovery ever made**, The Science Nation — Great Debate, for National Science Week, Maritime Museum, Sydney, Australia

2018 **Quantum computing — What you need to know and why**, NSW Knowledge Management Forum, Sydney, Australia

2017 **Spot the Bull**, Sydney Science Festival

2017 **Science in the Club — Quantum What?**, Armidale, Australia

2016 **Australian Institute of Physics Pub Night**, Sydney, Australia

2016 **Dennis Ritchie: The unsung hero of modern computing**, The Science Nation — Great Debate, Sydney Powerhouse Museum, Sydney, Australia

2016 **Quantum technologies of the future**, Pint of Science Festival, Sydney

2016 **Computing — Visions of the future**, The Science Nation — Storytelling of Science, Sydney Powerhouse Museum, Sydney, Australia

2015 **Australian Institute of Physics Pub Night**, Sydney, Australia

2015 **The Science Nation — Science Says!**, Sydney Powerhouse Museum, Sydney, Australia

2015 **Quantum physics beats astrophysics any day of the week!**, The Science Nation — Great Debate, Sydney Powerhouse Museum, Sydney Science Festival, Sydney, Australia

2014 **Australian Institute of Physics Pub Night**, Sydney, Australia

2015 **Australian Institute of Physics Free for All Variety Night**, Sydney, Australia

2015 **Science @ The Local**, Blue Mountains, Australia

2014 **An interview with Sir Peter Knight**, Macquarie University Physics & Astronomy Society, Sydney, Australia

The Science Nation (volunteer), Sydney, Australia

BrisScience public science seminar series (organising committee), Brisbane, Australia

Open-source

MoodSnap mood diary (`www.moodsnap.app`), A free mood diary app with analytics for iOS, made for everybody, written with features for people with mood disorders in mind. MoodSnap has been localised to 5 languages and is available on the Apple AppStore.

QuNet, A multi-user quantum network simulator featuring multi-path entanglement routing, and temporal routing for simulating quantum memories, written in Julia.

Jabalizer, An efficient stabiliser state simulator written in Julia, featuring graph state compilation from Clifford circuits.

Personal Activities

Alpinism, Mont Blanc (4,808m), Signalkuppe/Punta Gnifetti (4,554m), Dôme du Goûter (4,300m), Naso del Liskamm (4,272m), Castor (4,225m), Zinalrothorn (4,221m), Punta Felik (4,174 meters), Breithorn (4,163m), Felikhorn (4,087m), Weissmies (4,017m), Lagginhorn (4,010m), Aiguilles d'Entréves (3,600m), Monte Civetta (3,220m), Zugspitze (2,962m)
Student Club executive (Cultural Convener), Emmanuel College, University of Queensland
Writing & directing college musical, Emmanuel College, University of Queensland
Youth politics, Young Liberals QLD Management Committee, Fig Tree Pocket Executive, QLD Convention Delegate, QLD Senior Party Conference Delegate, QLD Policy Standing Committee, Fig Tree Pocket Newsletter Editor, Liberal Students Club Executive
Student Union, University of Queensland Postgraduate Committee
Election campaigning, Australian Federal election, Queensland State election, Brisbane City Council election
Running, Brisbane Marathon ("Lest we forget run") & Bridge to Brisbane run
Debating & public speaking, The Oxford Union, University of Queensland Debating Society, Commonwealth Bank Cup, Hume Barbor, Inter-College Cup, Plain English Speaking Awards, Mock Parliament, Young Liberal National Sir Jim Killen Public Speaking Competition, Griffith University Comedy Debate, Paderborn University Debating Society, Gutenberg Cup, Royal Australian Rant Society, Toastmasters
Drama, Emmanuel College One Act Play team, University of Queensland
Rowing, Emmanuel College rowing team (cox)
Choir, Macquarie University Choir, Wollongong Gospel Choir, Oxford Student Chorus, University of Queensland Musical Society, Emmanuel College, Armidale High School
Chess, University of Queensland Chess Club, Emmanuel College Chess team
Laughing Society, Emmanuel College Laughing Society (Founder & President)
Drumming, Samba Ninja Sydney, Trommel-Feuer Erlangen, Brisbane Samba School

Community & Charity

2020	**Senate inquiry submission**, *"Current barriers to patient access to medicinal cannabis in Australia"*, submission #133	*Australia*
2012-2016	**Lifeline counsellor**, Suicide intervention and crisis support telephone counselling	*Sydney, Australia*
2012-2015	**Human Capital Project (administrative committee)**, Providing micro-loans via personal equity contracts to provide university education for underprivileged students in Cambodia	*Brisbane, Australia*
2012-2016	**Applied Suicide Intervention Skills Training (ASIST)**, Training in emergency suicide intervention counselling	*Sydney, Australia*
2011	**Brisbane flood cleanup volunteer**, Volunteering to assist the recovery operation in Brisbane following the catastrophic 2011 floods	*Brisbane, Australia*
2004	**Election scrutineering**, Overseeing the counting of election ballots in the Australian federal election	*Brisbane, Australia*
	Charity fundraising, Raising money for educational charities in South America and supporting local charity events with entertainment	*Sydney, Australia*
2002	**'Shave for a Cure' Leukemia Foundation fundraiser**,	*Brisbane, Australia*
	Community radio announcer, 2ARM Armidale & VOX FM Illawarra	*Australia*
	Blood donor, Donating blood for the blood bank	*Australia*
	Group leader of the 'Stop Gay- and Trans-Hate Now' workshop, Leading a workshop for hate-affected gay and transexual youths to overcome stigma, discrimination and hatred	*Brisbane, Australia*
1997-1999	**Armidale Dance Party organisation group**, Providing a safe alcohol- and drug-free social and dance environment for Armidale's youth	*Armidale, Australia*
1996	**Armidale Streamwatch Society (vice president)**, Engaging with school students for environmental causes, specifically the preservation of waterways	*Armidale, Australia*

Published Photography

2024 **Australia's 50 Best Multi-day Walks**, Woodslane Press
2023 **Hiking Above Germany's Melting Glaciers During Europe's Record-Breaking Summer**, We Are Explorers
2022 **Thine be the Glory**, Wild Magazine
2022 **Italy's Iron Way: When Via Ferrata Routes Aren't Quite as Straight Forward as Expected**, We Are Explorers
2022 **What's in my pack?**, Great Walks
2022 **Kalymnos — A Climbing Haven in the Greek Isles**, We Are Explorers
2022 **How Hiking Made Me Love NSW Even More**, We Are Explorers
2022 **How Much Should You Spend On Hiking Gear?**, We Are Explorers
2021 **Kosciuszko to Kiandra — Hiking The Snowy Mountains in Summer**, We Are Explorers
2021 **Making Your Own Adventure on The NSW Mid-Coast**, We Are Explorers
2020 **Climbing The Crags of Point Perpendicular**, We Are Explorers
2020 **Coffs Harbour to Yamba: 125km of Coastal Hiking**, We Are Explorers

Radio & Podcasts

2023 **Will quantum computing break the internet?**, D3 - The RMIT Digital3 Podcast
2023 **The Quantum State (co-host)**, The Quantum Terminal podcast series
2022-2023 **Terminally Quantum (co-host)**, The Quantum Terminal podcast series
2022 **Blockchain meets quantum computing**, *Mint & Burn*, the RMIT Blockchain Innovation Hub podcast
2021 **The Quantum Internet**, Talk of Today
2019 **Optical quantum computing, the quantum internet, geo-strategic quantum politics, and the upcoming book "The Quantum Internet"**, meQuanics
2018 **Quantum Technology**, Science @ The Local podcast
2016 **A quantum computer does what?**, Think: Digital Futures, 2ser FM107.3, Sydney, Australia

Media Coverage

2023 **Quantum computers could slash the energy use of cryptocurrencies**, New Scientist
2023 **Researchers mine boson sampling for quantum blockchain approach**, The Quantum Insider
2023 **Scientists propose quantum proof-of-work consensus for blockchain**, Cointelegraph
2023 **Research paper around blockchain's proof-of-work mechanism released**, Financial Express
2023 **Quantum computing meets blockchain: Scientists propose new version of proof of work consensus – Future of crypto?**, Cryptonews
2023 **Heeding the happiness call: why academia needs to take faculty mental health more seriously**, Nature
2022 **Data security in a post-quantum world**, Sydney Quantum Academy
2020 **Quantum computing startup raises $215 million for faster device**, Bloomberg Businessweek, by Ashlee Vance, author of the biography of Elon Musk
2019 **Science at the Local looks at biological markers of trauma**, Blue Mountains Gazette
2018 **Sydney conferences seal city's global quantum computing reputation**, Computer World
2018 **A small-scale demonstration shows how quantum computing could revolutionise data analysis**, MIT Technology Review
2017 **Virtual interferometers may overcome scale issues**, New Electronics
2017 **'Virtual' interferometers may overcome scale issues for optical quantum computers**, Phys.org
2017 **'Virtual' interferometers may overcome scale issues for optical quantum computers**, EurekAlert
2017 **'Virtual' interferometers may overcome scale issues for optical quantum computers**, Scimex
2016 **Think: Digital Futures – A quantum computer does what?**, Radio 2ser FM107.3
2015 **Getting the measure of matter**, Sydney Morning Herald
2012 **Australian breakthrough brings quantum computing closer**, The Conversation

Conference Organisation

2022	**Technical program committee**, Quantum Resource Estimation (QRE)	*New York, USA*
2021	**Co-organiser**, Pakistan International Conference on Quantum Information & Computation (PICQIC)	*Islamabad, Pakistan*
2020	**Program committee**, Quantum Frontiers & Fundamentals (QFF)	*Bangalore, India*
2018	**Local organising committee**, Conference on the Theory of Quantum Computation, Communication & Cryptography (TQC)	*Sydney, Australia*
2015	**Local organising committee**, Quantum Information Processing (QIP)	*Sydney, Australia*
2014	**Editorial committee**, International Conference on Mathematical Modelling in Physical Sciences	*Madrid, Spain*
	Organiser, Macquarie University Physics & Astronomy Colloquium	*Sydney, Australia*
2012	**Organiser**, First Australian Quantum Walkshop	*Sydney, Australia*
2012	**Organising committee**, BrisScience	*Brisbane, Australia*
2007	**Local organising committee**, Quantum Information Processing (QIP)	*Brisbane, Australia*
2005	**Co-organiser**, Mathematical Aspects of Quantum Information Science (MAQIS)	*Brisbane, Australia*
2005	**Organiser**, University of Queensland Physics Colloquium	*Brisbane, Australia*

Popular Articles

2023	**An introduction to graph states**, Peter P. Rohde
2023	**How do photonic Bell measurements work?**, Peter P. Rohde
2022	**Leading by example: Living with mental illness in academia**, Peter P. Rohde (Voices of Academia & Dragonfly Mental Health)
2022	**MoodSnap! Technology for mental health**, Peter P. Rohde (The Spectator)
2021	**Blockchain finance in the quantum era**, Peter P. Rohde & Gavin Brennen (BTQ Blog)
2021	**Australia should invest in a home-grown quantum industry**, Gavin Brennen & Peter P. Rohde (The Strategist, Australian Strategic Policy Institute (ASPI))
2021	**Australia needs a strategy for critical technologies and the quantum revolution**, Gavin Brennen, Simon Devitt, Tara Roberson & Peter Rohde (The Strategist, Australian Strategic Policy Institute (ASPI))
2021	**The vision for the global quantum internet**, Peter P. Rohde (Fifteeneightfour — The Cambridge University Press Blog)
2021	**The logarithmic ape index**, Peter P. Rohde
2021	**Apple's child protection software is a government backdoor**, Peter P. Rohde
2021	**A case for universal basic income**, Peter P. Rohde
2020	**Jonathan Dowling (1955-2020)**, Peter P. Rohde
2020	**Medical marijuana in Australia is a scam**, Peter P. Rohde
2020	**Sex crimes vs ware crimes (on Seth Lloyd, Jeffrey Epstein and the military industrial complex)**, Peter P. Rohde
2019	**Encryption & anonymity is a responsibility not a right – in defence of cryptoanarchy**, Peter P. Rohde
2019	**Don't stop fake news**, Peter P. Rohde
2012	**Particles and persecution: why we should care about Iranian physicists**, Thomas Stace & Peter P. Rohde (The Conversation)
2012	**Why I am opposed to an Australian Bill of Rights**, Peter P. Rohde (Issues in Society – Human Rights & Civil Liberties)

Publications

Statistics

Peer-reviewed publications, 65
Citations, $> 3,500$
H-index, 32
i10-index, 64
Highlights, Author of *"The Quantum Internet"* (Cambridge University Press), 2 publications in *Science*, 5 publications in *Physical Review Letters*, 1 publication in *Optica*, 2 book chapters, 1 policy brief

Books

2021 **The Quantum Internet**, Peter P. Rohde (Cambridge University Press)

Theses

2008 **Towards optical quantum information processing**, Peter P. Rohde (PhD thesis)
2004 **Non-idealised models in linear optics quantum computing**, Peter P. Rohde (Honours thesis)

Book Chapters

2015 **An introduction to boson-sampling**, Bryan T. Gard, Keith R. Motes, Jonathan P. Olson, Peter P. Rohde & Jonathan P. Dowling (in: From Atomic to Mesoscale: The Role of Quantum Coherence in Systems of Various Complexities, World Scientific Publishing)
2005 **The ecological niches of parasites**, Klaus Rohde & Peter P. Rohde (in: Marine Parasitology, CSIRO Publishing)

Policy Briefs

2021 **An Australian strategy for the quantum revolution**, Gavin Brennen, Simon Devitt, Tara Roberson & Peter Rohde (Australian Strategic Policy Institute (ASPI), International Cyber Policy Centre)

Journal Publications

2025 **Faster and improved validation algorithm for boson sampling using coarse graining**, Gopikrishnan Muraleedharan, Sanaa Sharma, Deepesh Singh, Nicolas R. Newton, Peter P. Rohde & Gavin K. Brennen, SMT 2025
2025 **Proof-of-work consensus by quantum sampling**, Deepesh Singh, Boxiang Fu, Gopikrishnan Muraleedharan, Chen-Mou Cheng, Nicolas Roussy Newton, Peter P. Rohde & Gavin K. Brennen, Quantum Science & Technology **10**, 025020
2024 **Improving continuous-variable quantum channels with unitary averaging**, S. Nibedita Swain, Ryan J. Marshman, Peter P. Rohde, Austin P. Lund, Alexander S. Solntsev & Timothy C. Ralph, Physical Review A **110**, 032622
2024 **Optical cluster-state generation with unitary averaging**, Deepesh Singh, Austin P. Lund & Peter P. Rohde, Physical Review A **110**, 012457
2024 **Compilation of algorithm-specific graph states for quantum circuits**, Madhav Krishnan Vijayan, Alexandru Paler, Jason Gavriel, Casey R. Myers, Peter P. Rohde & Simon J. Devitt, Quantum Science & Technology **9**, 025005
2024 **Upper bounds for the clock speeds of fault-tolerant distributed quantum computation using satellites to supply entangled photon pairs**, Hudson Leone, S. Srikara, Peter P. Rohde & Simon Devitt, Physical Review Research **5**, 043302
2024 **Quantum conditional mutual information of W state in non-inertial frames**, Saveetha Harikrishnan, Peter P. Rohde & Chandrashekar Radhakrishnan, Physica Scripta **99**, 025106
2023 **Experimental Proposal for Validation of W-state Protocol for Qubits and Qudits**, Rohit K. Ramakrishnan, Aravinth Balaji Ravichandran, Srinivas Talabattula, Anindya Banerji, Nijil Lal, Sarika Mishra, R. P. Singh & Peter P. Rohde, CLEO 2023, JTh2A.30
2022 **Reducing circuit complexity in optical quantum computation using 3D architectures (editor's pick)**, Wen-Hao Zhou, Madhav Krishnan Vijayan, Xiao-Wei Wang, Yong-Heng Lu, Jun Gao, Zhi-Qiang Jiao, Ruo-Jing Ren, Yi-Jun Chang, Zi-Song Shen, Peter P. Rohde & Xian-Min Jin, Optics Express **30**, 32887

2022 **Integrated photonic platforms for quantum technology: A review (invited),** Rohit K. Ramakrishnan, Aravinth Balaji Ravichandran, Arpita Mishra, Archana Kaushalram, Gopalkrishna Hegde, Srinivas Talabattula & Peter P. Rohde, ISSS Journal of Micro & Smart Systems

2022 **The quantum internet: A hardware review (invited),** Rohit K. Ramakrishnan, Aravinth Balaji Ravichandran, Ishwar Kaushik, Gopalkrishna Hegde, Srinivas Talabattula & Peter P. Rohde, Journal of the Indian Institute of Science

2022 **Accessible and inaccessible quantum coherence in relativistic quantum systems,** Saveetha Harikrishnan, Segar Jambulingam, Peter P. Rohde & Chandrashekar Radhakrishnan, Physical Review A **105**, 052403

2021 **Photonic quantum data locking,** Zixin Huang, Peter P. Rohde, Dominic W. Berry, Pieter Kok, Jonathan P. Dowling & Cosmo Lupo, Quantum **5**, 447

2020 **Photonic quantum error correction of linear optics using W-state encoding,** Madhav Krishnan Vijayan, Austin P. Lund & Peter P. Rohde, Quantum **4**, 303

2020 **Homomorphic encryption of linear optics quantum computation on almost arbitrary states of light with asymptotically perfect security,** Yingkai Ouyang, Si-Hui Tan, Joseph Fitzsimons & Peter P. Rohde, Physical Review Research **2**, 013332

2020 **Relativity of quantum states in entanglement swapping,** Chris Nagele, Ebubechukwu O. Ilo-Okeke, Peter P. Rohde, Jonathan P. Dowling & Tim Byrnes, Physics Letters A **384**, 126301

2019 **The resurgence of the linear optics interferometer — Recent advances & applications,** Si-Hui Tan & Peter P. Rohde, (invited) Reviews in Physics **4**, 100030

2018 **Practical quantum somewhat-homomorphic encryption with coherent states,** Si-Hui Tan, Yingkai Ouyang & Peter P. Rohde, Physical Review A **97**, 042308

2018 **Demonstration of topological data analysis on a quantum processor,** He-Liang Huang, Peter P. Rohde, Xi-Lin Wang, Yi-Han Luo, You-Wei Zhao, Chang Liu, Li Li, Nai-Le Liu, Chao-Yang Lu & Jian-Wei Pan, Optica **5**, 193

2017 **Passive quantum error correction of linear optics networks through error averaging,** Ryan J. Marshman, Austin P. Lund, Peter P. Rohde & Timothy C. Ralph, Physical Review A **97**, 022324

2017 **Multiphoton interference in quantum Fourier transform circuits and applications to quantum metrology,** Zu-En Su, Yuan Li, Peter P. Rohde, He-Liang Huang, Xi-Lin Wang, Li Li, Nai-Le Liu, Jonathan P. Dowling, Chao-Yang Lu & Jian-Wei Pan, Physical Review Letters **119**, 080502

2017 **Linear optical quantum metrology with single photons — Experimental errors, resource counting, and quantum Cramér-Rao bounds,** Jonathan P. Olson, Keith R. Motes, Patrick M. Birchall, Nick M. Studer, Margarite LaBorde, Todd Moulder, Peter P. Rohde & Jonathan P. Dowling, Physical Review A **96**, 013810

2017 **Measurement-based linear optics,** Rafael N. Alexander, Natasha Gabay, Peter P. Rohde & Nicolas C. Menicucci, Physical Review Letters **118**, 110503

2016 **Efficient recycling strategies for preparing large Fock states from single-photon sources: Applications to quantum metrology,** Keith R. Motes, Ryan L. Mann, Jonathan P. Olson, Nicholas M. Studer, E. Annelise Bergeron, Alexei Gilchrist, Jonathan P. Dowling, Dominic W. Berry & Peter P. Rohde, Physical Review A **94**, 012344

2016 **Quantum random walks on congested lattices,** Keith R. Motes, Alexei Gilchrist & Peter P. Rohde, Scientific Reports **6**, 19864

2015 **Implementing scalable boson sampling with time-bin encoding: analysis of loss, mode mismatch, and time jitter,** Keith R. Motes, Jonathan P. Dowling, Alexei Gilchrist & Peter P. Rohde, Physical Review A **92**, 052319

2015 **Multiplexed single-photon state preparation using a fibre-loop architecture,** Peter P. Rohde, L. G. Helt, M. J. Steel & Alexei Gilchrist, Physical Review A **92**, 053829

2015 **Multi-scale quantum simulation of quantum field theory using wavelets,** Gavin K. Brennen, Peter P. Rohde, Barry C. Sanders & Sukhwinder Singh, Physical Review A **92**, 032315

2015 **The on-ramp to the all optical quantum information processing highway,** Peter P. Rohde & Jonathan P. Dowling, invited perspective article, Science **349**, 696

2015 **Linear optical quantum metrology with single photons: Exploiting spontaneously generated entanglement to beat the shot-noise limit,** Keith R. Motes, Jonathan P. Olson, Evan J. Rabeaux, Jonathan P. Dowling, S. Jay Olson & Peter P. Rohde, Physical Review Letters **114**, 170802

2015 **Boson sampling with displaced single-photon Fock states versus single-photon-added coherent states — The quantum-classical divide and computational-complexity transitions in linear optics**, Kaushik P. Seshadreesan, Jonathan P. Olson, Keith R. Motes, Peter P. Rohde & Jonathan P. Dowling, Physical Review A **91**, 022334

2015 **Sampling arbitrary photon-added or photon-subtracted squeezed states is in the same complexity class as boson sampling**, Jonathan P. Olson, Kaushik P. Seshadreesan, Keith R. Motes, Peter P. Rohde & Jonathan P. Dowling, Physical Review A **91**, 022317

2015 **Evidence for the conjecture that sampling generalized cat states with linear optics is hard**, Peter P. Rohde, Keith R. Motes, Paul Knott, Joseph Fitzsimons, William Munro & Jonathan P. Dowling, Physical Review A **91**, 012342

2015 **Simple scheme for universal linear optics quantum computing with constant experimental complexity using fiber loops**, Peter P. Rohde, Physical Review A **91**, 012306

2015 **Boson sampling with photons of arbitrary spectral structure**, Peter P. Rohde, Physical Review A **91**, 012307

2014 **Scalable boson-sampling with time-bin encoding using a loop-based architecture**, Keith R. Motes, Alexei Gilchrist, Jonathan P. Dowling & Peter P. Rohde, Physical Review Letters **113**, 120501

2014 **Quantum walks with tuneable self-avoidance in one dimension**, Elizabeth Camilleri, Peter P. Rohde & Jason Twamley, Scientific Reports **4**, 4791

2013 **Spontaneous parametric down-conversion photon sources are scalable for boson-sampling in the asymptotic limit**, Keith R. Motes, Jonathan P. Dowling & Peter P. Rohde, Physical Review A **88**, 063822

2013 **Information capacity of a single photon**, Peter P. Rohde, Joseph F. Fitzsimons & Alexei Gilchrist, Physical Review A **88**, 022310

2013 **Quantum walks with memory provided by recycled coins and a memory of the coin-flip history**, Peter P. Rohde, Gavin K. Brennen & Alexei Gilchrist, Physical Review A **87**, 052302

2012 **Optical quantum computing with photons of arbitrarily low fidelity and purity**, Peter P. Rohde, Physical Review A **86**, 052321

2012 **Quantum walks with encrypted data**, Peter P. Rohde, Joseph F. Fitzsimons & Alexei Gilchrist, Physical Review Letters **109**, 150501

2013 **Increasing the dimensionality of quantum walks using multiple walkers**, Peter P. Rohde, Andreas Schreiber, Martin Štefaňák, Igor Jex, Alexei Gilchrist & Christine Silberhorn, Journal of Computational & Theoretical Nanoscience **10**, 1644

2012 **A 2D quantum walk simulation of two-particle dynamics**, Andreas Schreiber, Aurél Gábris, Peter P. Rohde, Kaisa Laiho, Martin Štefaňák, Václav Potoček, Craig Hamilton, Igor Jex & Christine Silberhorn, Science **336**, 55

2012 **Error tolerance of the boson-sampling model for linear optics quantum computing**, Peter P. Rohde & Timothy C. Ralph, Physical Review A **85**, 022332

2012 **Entanglement dynamics and quasi-periodicity in discrete quantum walks**, Peter P. Rohde, Alessandro Fedrizzi & Timothy C. Ralph, Journal of Modern Optics **59**, 710

2011 **Time-resolved detection and mode-mismatch in linear optics quantum gates**, Peter P. Rohde & Timothy C. Ralph, New Journal of Physics **13**, 053036

2011 **Multi-walker discrete time quantum walks on arbitrary graphs, their properties, and their photonic implementation**, Peter P. Rohde, Andreas Schreiber, Martin Štefaňák, Igor Jex & Christine Silberhorn, New Journal of Physics **13**, 013001

2010 **Scalable quantum computing with atomic ensembles**, Sean D. Barrett, Peter P. Rohde & Thomas M. Stace, New Journal of Physics **12**, 093032

2008 **Entanglement of remote spins with unequal coupling to an optically active mediator**, Erik M. Gauger, Peter P. Rohde, A. Marshall Stoneham & Brendon W. Lovett, New Journal of Physics **10**, 073027

2008 **How to measure host specificity**, Klaus Rohde & Peter P. Rohde, Vie et Milieu (Life & Environment) **58**, 121

2008 **Practical effects in the preparation of cluster states using weak non-linearities**, Peter P. Rohde, William J. Munro, Timothy C. Ralph, Peter van Loock & Kae Nemoto, QIC **8**, 0053

2007 **Photon number projection using non-number-resolving detectors**, Peter P. Rohde, James G. Webb, Elanor H. Huntington & Timothy C. Ralph, New Journal of Physics **9**, 233

2007 **Strategies for the preparation of large cluster states using non-deterministic gates**, Peter P. Rohde & Sean D. Barrett, New Journal of Physics **9**, 198

2007 **Spectral structure and decompositions of optical states, and their applications**, Peter P. Rohde, Wolfgang Mauerer & Christine Silberhorn, New Journal of Physics **9**, 91

2008 **Trade-off between the tolerance of located and unlocated errors in nondegenerate quantum error-correcting codes**, Henry L. Haselgrove & Peter P. Rohde, QIC **8**, 0399

2007 **Error tolerance and tradeoffs in loss- and failure-tolerant quantum computing schemes**, Peter P. Rohde, Timothy C. Ralph & William J. Munro, Physical Review A **75**, 010302(R)

2006 **Error models for mode-mismatch in linear optics quantum computing**, Peter P. Rohde & Timothy C. Ralph, Physical Review A **73**, 062312

2006 **Practical limitations in optical entanglement purification**, Peter P. Rohde, Timothy C. Ralph & William J. Munro, Physical Review A **73**, 030301(R)

2006 **Modeling photo-detectors in quantum optics**, Peter P. Rohde & Timothy C. Ralph, Journal of Modern Optics **53**, 1589

2005 **Optimal photons for quantum information processing**, Peter P. Rohde, Timothy C. Ralph & Michael A. Nielsen, Physical Review A **72**, 052332

2005 **Quantum gate characterization in an extended Hilbert space**, Peter P. Rohde, G. J. Pryde, J. L. O'Brien & Timothy C. Ralph, Physical Review A **72**, 032306

2005 **Non-deterministic approximation of photon number discriminating detectors using non-discriminating detectors**, Peter P. Rohde, Journal of Optics B **7**, 82

2005 **Frequency and temporal effects in linear optical quantum computing**, Peter P. Rohde & Timothy C. Ralph, Physical Review A **71**, 032320

2001 **Fuzzy Chaos: Reduced chaos in the combined dynamics of several independently chaotic populations**, Klaus Rohde & Peter P. Rohde, American Naturalist **158**, 553

Preprints

2022 **A general framework for the composition of quantum homomorphic encryption & quantum error correction**, Yingkai Ouyang & Peter P. Rohde

2021 **QuNet: Cost vector analysis & multi-path entanglement routing in quantum networks**, Hudson Leone, Nathaniel Miller, Deepesh Singh, Nathan K. Langford & Peter P. Rohde

2021 **Quantum crypto-economics: Blockchain prediction markets for the evolution of quantum technology**, Peter P. Rohde, Vijay Mohan, Sinclair Davidson, Chris Berg, Darcy Allen, Gavin K. Brennen & Jason Potts

2019 **Photonic quantum simulations of SSH-type topological insulators with perfect state transfer**, M. Stobińska, T. Sturges, A. Buraczewski, W. R. Clements, J. J. Renema, S. W. Nam, T. Gerrits, A. Lita, Peter P. Rohde, W. S. Kolthammer, A. Eckstein & I. A. Walmsley

2016 **A quantum optics argument for the #P-hardness of a class of multidimensional integrals**, Peter P. Rohde, Dominic W. Berry, Keith R. Motes & Jonathan P. Dowling

2015 **Bosonic interference as a complementary resource for implementation of quantum walks**, agdalena Stobińska, Peter P. Rohde, Paweł Kurzyński & Anton Zeilinger

2014 **Will boson-sampling ever disprove the Extended Church-Turing thesis?**, Peter P. Rohde, Keith R. Motes, Paul Knott & William J. Munro

2011 **Optimising number resolving photo-detectors using classical post-processing**, Peter P. Rohde

2010 **Are quantum walks the saviour of optical quantum computing?**, Peter P. Rohde

2006 **Improving the fidelity of single photon preparation from conditional down-conversion via asymmetric multiport detection**, Peter P. Rohde

2007 **Noise thresholds for entanglement purification**, Peter P. Rohde

2007 **Error propagation in loss- and failure-tolerant quantum computation schemes**, Peter P. Rohde, Timothy C. Ralph & William J. Munro

2005 **Quantum state tomography of single photon sources in the spectral degree of freedom**, Peter P. Rohde

Unpublished papers & notes

2025 **A mathematical critique of socio-political chaos**, Peter P. Rohde

2025 **Computer architecture notes (CMOS architecture using reversible differential codes)**, Peter P. Rohde

2024 **Distributed consensus networks**, Peter P. Rohde

2024 **Information security in the quantum era**, Peter P. Rohde

2024 **Information-theoretically secure post-quantum cryptography (notes #1)**, Peter P. Rohde

2024 **Information-theoretically secure post-quantum cryptography (notes #2)**, Peter P. Rohde

2024 **Quantum cryptographic primitives using graph states**, Peter P. Rohde

2024 **Graph state digital signature scheme**, Peter P. Rohde

Presentations

Invited Talks

2023	**A brief history of optical quantum computing**, Sydney Quantum Academy student seminar series	*Sydney, Australia*
2023	**The quantum internet**, CQuERE, TCG CREST	*Kolkata, India*
2023	**The quantum internet**, International School on Physics & Allied Disciplines (ISPAD)	*Islamabad, Pakistan*
2023	**The quantum internet**, Jonathan P. Dowling Memorial Conference	*Sydney, Australia*
2022	**The vision of the global quantum internet**, Telstra Unconference	*Sydney, Australia*
2022	**Optical quantum computing, boson-sampling & quantum networking**, ACM School on Quantum Computing, Indian Institute for Technology Madras	*Madras, India*
2021	**Evolution of the quantum internet: Secure cloud quantum computation**, Inside Quantum Technology (IQT)	*New York, USA*
2021	**Quantum networking**, Quantum Communications Workshop (QCW), IEEE-IISc Communications Society	*Bangalore, India*
2021	**The quantum internet**, Sydney Quantum Academy seminar series	*Sydney, Australia*
2020	**Multi-path entanglement routing in the quantum internet**, Quantum Frontiers & Fundamentals (QFF), Raman Research Institute (RRI)	*Bangalore, India*
2020	**Geo-strategic politics in the quantum era**, Raman Research Institute (RRI)	*Bangalore, India*
2018	**The quantum internet — Towards the singularity**, Indian Institute of Science	*Bangalore, India*
2018	**The quantum internet — Implications for society**, Quantum Frontiers & Fundamentals (QFF)	*Bangalore, India*
2018	**The quantum internet — Implications for society**, University of Science & Technology China	*Shanghai, China*
2017	**The quantum internet — Implications for society**, International Workshop on Quantum Computing & Quantum Information Processing (QCQIP)	*Beijing, China*
2017	**Quantum computing — A gentle introduction**, Indian Institute of Science	*Bangalore, India*
2017	**Introduction to optical quantum computing**, Brainstorming Workshop on Quantum Computation, Information, Communications & Cryptography, Indian Institute of Science	*Bangalore, India*
2017	**Optical quantum information processing — From beginnings to the cutting edge (4 part series)**, Summer school in Optics & Photonics (SOAP), Indian Institute of Science	*Bangalore, India*
2017	**Advances in linear optics quantum information processing**, Centre for Quantum Technologies (CQT), National University of Singapore	*Singapore*
2017	**Encrypted optical quantum computation**, Centre for Quantum Technologies (CQT), National University of Singapore	*Singapore*
2017	**Encrypted optical quantum computation**, Centre for Quantum Computation & Communication Technology (CQC^{2}T) Quantum Optics Workshop, University of Queensland	*Brisbane, Australia*
2016	**Introduction to optical quantum information processing**, COMMAD'2016, Optoeletronic & Microelectronic Materials & Devices, University of New South Wales	*Sydney, Australia*
2016	**Post-classical quantum computation — A vision for the future**, Centre for Ultrahigh bandwidth Devices for Optical Systems (CUDOS) Quantum Photonics Connections Conference	*Sydney, Australia*
2016	**Verification of boson-sampling devices**, University of Science & Technology China	*Shanghai, China*
2016	**An introduction to boson-sampling**, University of Science & Technology China	*Shanghai, China*
2016	**An introduction to computational complexity theory**, University of Science & Technology China	*Shanghai, China*
2016	**Bitcoin, the Blockchain & smart contracts**, Australian Libertarian Society Friedman Conference	*Sydney, Australia*
2016	**Strategies for the efficient preparation of large photon-number Fock states**, Centre for Quantum Computation & Intelligent Systems	*Sydney, Australia*
2016	**Errors and scalability in boson-sampling**, RMIT Photonic Quantum Computing Workshop	*Melbourne, Australia*
2015	**Resource efficient schemes for linear optics quantum computing using fiber-loops**, University of Maryland	*Maryland, USA*
2015	**Resource efficient schemes for linear optics quantum computing using fiber-loops**, Macquarie University Quantum Sciences	*Sydney, Australia*
2015	**Linear optical quantum metrology with single photons — Exploiting spontaneously generated entanglement to beat the shotnoise limit**, University of Sydney	*Sydney, Australia*
2015	**Fiber-loop architectures for optical quantum information processing**, University of Sydney	*Sydney, Australia*
2014	**Boson-sampling: the first post-classical quantum computer?**, Sydney Quantum Information Theory Workshop	*Sydney, Australia*

2014	**The role of charity in civil society**, Australian Libertarian Society Friedman Conference	*Sydney, Australia*
2014	**Boson-sampling: a new route for optical quantum computing**, Centre of Excellence for Engineered Quantum Systems (EQuS), Macquarie University	*Sydney, Australia*
2014	**Quantum walks with memory**, American Mathematical Society Special Session on Quantum Walks, Quantum Computation & Related Topics	*Baltimore, USA*
2013	**An introduction to boson-sampling**, Institute of Theoretical Physics & Astrophysics, University of Gdansk	*Gdansk, Poland*
2012	**An introduction to computational complexity theory**, Centre of Excellence for Engineered Quantum Systems (EQuS), Macquarie University	*Sydney, Australia*
2012	**An introduction to wavelet theory**, Centre of Excellence for Engineered Quantum Systems (EQuS), Macquarie University	*Sydney, Australia*
2012	**An introduction to quantum walks**, First Australian Quantum Walkshop	*Sydney, Australia*
2011	**Advances in linear optics quantum computing**, Leibnitz University	*Hannover, Germany*
2011	**What do we need to build an optical quantum computer?**, University of Paderborn	*Paderborn, Germany*
2009	**Escher — A de novo genetic sequencing tool using graph theory**, International Conference on De Novo Sequencing	*Beijing, China*
2007	**Strategies for the preparation of cluster states using non-deterministic gates**, University of Oxford	*Oxford, UK*
2006	**Mode-matching effects in linear optics quantum computing**, International Conference on Quantum Optics (ICQO)	*Minsk, Belarus*
2005	**A theoretical introduction to quantum walks**, Max-Planck Institute for the Science of Light	*Erlangen, Germany*

Invited Panel Discussions & Debates

2023	**Future Communications Research Centre Industry Forum**, Macquarie University	*Sydney, Australia*
2023	**Cyber security in the quantum age**, Quantum Australia	*Sydney, Australia*
2022	**Keeping data safe in a post quantum world**, Gateway Network Governance Body (GNGB)	*Sydney, Australia*
2022	**Quantum Networking — A national quantum network: opportunities and challenges**, Quantum Australia	*Sydney, Australia*
2022	**Why quantum communication?**, Inside Quantum Technology (IQT)	*The Hague, Netherlands*
2021	**ASPI Presents: An Australian strategy for the quantum revolution**, Australian Strategic Policy Institute (ASPI)	*Canberra, Australia*
2018	**Should Australia be a Republic or a Monarchy?**, Australian Libertarian Society Friedman Conference	*Sydney, Australia*

Contributed Talks

2023	**Distributed consensus using quantum proof-of-work**, Virtual Science Forum Speaker's Corner	*Online*
2015	**Fiber-loop architectures for optical quantum information processing**, Centre for Ultrahigh bandwidth Devices for Optical Systems (CUDOS) Workshop, University of Sydney	*Sydney, Australia*
2013	**Quantum walks with memory**, Quantum Simulation & Quantum Walks Workshop	*Pisa, Italy*
2012	**A 2D quantum walk simulation of two-particle dynamics**, Australian Institute of Physics Congress (AIP)	*Sydney, Australia*
2012	**Optical multi-walker quantum walks**, Quantum Dynamics & Quantum Walks Workshop	*Okazaki, Japan*