Travis J. Baker

Curriculum Vitae

Personal Data

Name:	Dr. Travis J. Baker
Address:	School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore
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Research Pages:	Google Scholar, arXiv, GitHub, CQC^{2}T

Professional History

Oct 2022 – *Present*	Research Fellow Complexity Institute School of Physical and Mathematical Sciences Nanyang Technological University
Feb 2021 – Oct 2022	Research Fellow Centre for Quantum Dynamics Centre for Quantum Computation and Communication Technology (CQC^{2}T) Griffith University

Education

Feb 2017- Jun 2021	Doctorate of Philosophy Centre for Quantum Dynamics Griffith University Thesis title: "Quantum correlations: Schrödinger's steering in lossy conditions; Heisenberg's limit to laser coherence." Supervisor: Professor H. M. Wiseman Conferral date: 16 Jun 2021
Jan 2014- Nov 2016	Bachelor of Science with Class I Honours Griffith University, Nathan Physics & Applied Mathematics double major Thesis title: "New Conditions for Establishing the One-Way Steerability of Quantum States" Supervisor: Professor H. M. Wiseman Cumulative Gpa: 6.90/7.00

Publications

1. Q.-C. Song, T. J. Baker, H. M. Wiseman. On the power of one pure steered state for EPR-steering with a pair of qubits. arxiv:2212.10825 DOI: arXiv.2208.14082

2. L. A. Ostrowski, T. J. Baker, S. N. Saadatmand, H. M. Wiseman. Optimized Laser Models with Heisenberg-Limited Coherence and Sub-Poissonian Beam Photon Statistics. arXiv:2208.14082 DOI: arXiv.2208.14082

3. L. A. Ostrowski, T. J. Baker, S. N. Saadatmand, H. M. Wiseman. No Tradeoff between Coherence and Sub-Poissonianity for Heisenberg-Limited Lasers. arXiv:2208.14081 DOI: arXiv.2208.14081

4. S. Cheng, L. Liu, T. J. Baker, M. J. W. Hall. Recycling qubits for the generation of Bell nonlocality between independent sequential observers. Phys. Rev. A 105, 022411 (2022) (e-print available at arxiv:2109.03472) DOI: 10.1103/PhysRevA.105.022411

5. S. Cheng, L. Liu, T. J. Baker, M. J. W. Hall. Limitations on sharing Bell nonlocality between sequential pairs of observers. Phys. Rev. A 104, L060201 (2021) (e-print available at arxiv:2102.11574) DOI: 10.1103/PhysRevA.104.L060201

6. T. J. Baker, S. N. Saadatmand, D. W. Berry and H. M. Wiseman. The Heisenberg limit for laser coherence. Nat. Phys. (2020).
(e-print available at arxiv:2009.05296, DOI: 10.1038/s41567-020-01049-3)

7. T. J. Baker and H. M. Wiseman,
Necessary conditions for steerability of two qubits, from consideration of local operations.
Phys. Rev. A. **101**, 022326. (2020). (e-print available at arxiv:1906.04693, DOI: 10.1103/PhysRevA.101.022326)

8. N. Tischler, F. Ghafari, T. J. Baker, Sergei Slussarenko, Raj B. Patel, Morgan M. Weston, Sabine Wollmann, Lynden K. Shalm, Varun B. Verma, Sae Woo Nam, H. Chau Nguyen, Howard M. Wiseman, and Geoff J. Pryde
Conclusive experimental demonstration of one-way Einstein-Podolsky-Rosen steering
Phys. Rev. Lett. 121, 100401 (2018). (e-print available at arxiv:1806.10279) DOI: 10.1103/PhysRevLett.121.100401
Editor's Suggestion, for Letters that have "particular importance, innovation, and broad appeal"

9. T. J. Baker, S. Wollmann, G. J. Pryde, and H. M. Wiseman
Necessary condition for steerability of arbitrary two-qubit states with loss, J. Opt. 20, 034008, *Special Issue on Photonic Entanglement.* (e-print available at arxiv:1710.11355 DOI: 10.1088/2040-8986/aaaa3c

Coverage in non-specialist Reviews

2021 Sophia Chen, "Physicists Are Reinventing the Laser"
GIZMODO, 30/01/2021
https://gizmodo.com/physicists-are-reinventing-the-laser-1846085004
Article on:
T. J. Baker, S. N. Saadatmand, D. W. Berry and H. M. Wiseman. The Heisenberg limit for laser coherence. Nat. Phys. (2020).

2020 Howard Wiseman (one of the authors), "Reimagining the laser: new ideas from quantum theory could herald a revolution"
The Conversation, 27/10/2020
https://theconversation.com/reimagining-the-laser-new-ideas-from-quantum-theory-could-herald-a-revolution-147436
Article on:
T. J. Baker, S. N. Saadatmand, D. W. Berry and H. M. Wiseman. The Heisenberg limit for laser coherence. Nat. Phys. (2020).

2020 Lauren Fuge, "Pushing the laser limit"
Cosmos, 27/10/2020
https://cosmosmagazine.com/science/physics/pushing-the-laser-limit/
Article on:
T. J. Baker, S. N. Saadatmand, D. W. Berry and H. M. Wiseman. The Heisenberg limit for laser coherence. Nat. Phys. (2020).

2019 Chris Lee, "Entanglement allows one party to control measurement results"
Ars Technica, 19/9/2018
https://arstechnica.com/science/2018/09/quantum-entanglement-used-to-steer-measurement-results/
Article on:
N. Tischler, F. Ghafari, T. J. Baker *et al.*
Conclusive experimental demonstration of one-way Einstein-Podolsky-Rosen steering,
Phys. Rev. Lett. 121, 100401 (2018).

Teaching Experience

Tri 1, 2019–2020	Aviation Science (1507NSC) Course Tutor Institution: Griffith University, Nathan campus
Tri 1, 2019	Physics 1A & Engineering Science (1031SCG) Course Tutor Institution: Griffith University, Nathan campus
Sem 1, 2017	Classical and Quantum Physics II (2303NSC) Course Tutor Institution: Griffith University, Nathan and Gold Coast campuses

Conferences and Workshops

May 2022	Invited talk for the Nanyang Quantum Hub Invited Talk for Work Package 5: *Demonstrating multiparty steering from stochastically shared entanglement*
Dec 2021	Australian Institute of Physics Summer Meeting Talk title: *The Heisenberg Limit for Laser Coherence*
Feb 2021	Centre for Quantum Computation and Communication Technology (CQC2T) Workshop Invited Talk for Work Package 5: *Demonstrating multiparty steering from stochastically shared entanglement*
Dec 2020	Centre for Quantum Dynamics Colloquium Talk title: *The Heisenberg Limit for Laser Coherence*
Jan 2020	Centre for Quantum Computation and Communication Technology (CQC2T) Workshop Poster title: *Loss-Tolerant Steering Inequalities*
Jan 2019	Centre for Quantum Computation and Communication Technology (CQC2T) Workshop Poster title: *The Heisenberg Limit for Laser Coherence*
Dec 2018	Australian Institute of Physics (AIP) Congress University of Western Australia, Perth Poster title: *The Heisenberg Limit for Laser Coherence*
Jan 2018	Quantum Computer Science Summer School Univerisity of Technology Sydney

Scholarships and Awards

2017–2020	Research Training Program (RTP) Scholarship (Formerly the Australian Postgraduate Award)
2017–2020	HDR Student Top-up Scholarship Funded by the Centre for Quantum Dynamics, Griffith University
2016	University Medal
2014–2016	Sir Samuel Griffith Scholarship (valued at $24 000)
2016	Awarded Griffith Honours College Scholar (Academic Excellence, Leadership and Community Engagement)
2014–2016	Griffith Honours College (top 2% of undergraduates who demonstrate leadership and community engagement are invited to join each year)
2015	Griffith School of Natural Sciences Academic Excellence Medallion
2014–2015	Griffith Award for Academic Excellence
2012	Australian Institute of Physics Certificate of Excellence

Other Research Experience

Dec 2015-Feb 2016 — Summer Project at Centre for Quantum Dynamics, **Griffith University**

Derived monogamy inequalities for entangled quantum states exhibiting two-party EPR-steering. Significant numerical work was also conducted to investigate monogamy relations of non-linear necessary and sufficient conditions for steering. | Supervisor: Dr. E. G. Cavalcanti

Nov 2014-Feb 2015 — Summer Scholarship at Centre for Quantum Dynamics, **Griffith University**

Analyzed the quantum mechanical properties of polarized light through fabricated waveguides, developed an experimental setup to efficiently and effectively couple bare optical fibres to other media and obtained necessary documentation to operate high class lasers. | Supervisor: Professor G. J. Pryde

Affiliations

2022-*Current*	Adjunct Research Fellow, Centre for Quantum Dynamics, Griffith University
2017-*Current*	Australian Institute of Physics
2015-2021	The Optical Society (formerly the Optical Society of America) Student member
2017 - 2019	Treasurer of The Optical Society Griffith University Student Chapter

References

Available upon request.