

Nathan Sean Babcock

Mobile: +1 (717) 524 7591

E-mail: nbabcock@gmail.com

Web: www.nathanbabcockphd.com

Education

- 2023** Higher Education Teaching Certificate, Harvard University, Cambridge, Massachusetts, USA
- 2015** Doctor of Philosophy, Physics (Quantum Bioscience), University of Calgary, Alberta, Canada
- 2005** Bachelor of Science, Honours Physics (Dean's List), University of Waterloo, Ontario, Canada

Professional Experience

- 2025–2026** **Consulting STEM Fellow**, Human Frontier Collective, Scale AI, San Francisco, USA
Design, evaluation, & interpretation of advanced generative AI systems for scientific applications.
- 2020–2025** **Research Associate & Consultant**, Quantum Biology Laboratory, Howard University, USA
Developed and simulated photonic models of biological superradiance in cellular ultrastructure.
- 2019–2020** **Postdoctoral Researcher**, Department of Physics and Astronomy, University of Exeter, UK
Developed and assessed quantum spin chemical models of avian biomagnetic sensing.
- 2015–2018** **Postdoctoral Researcher**, Physics Department, Simon Fraser University, British Columbia
Developed information-based schemes to rank and validate protein crystal models.
- 2006–2014** **Investigator**, Institute for Quantum Science & Technology, University of Calgary, Alberta
*Simulated and analysed tunneling-mediated biological electron transfer reactions.
Developed protocols for the precision control and entanglement of atomic qubits.*
- 2005** **Research Assistant**, Institute for Quantum Computing, University of Waterloo, Ontario
Designed an algorithm for nuclear magnetic resonance quantum error correction.
- 2004** **Commercial Researcher**, 2D2C Inc., Waterloo, Ontario (www.2d2c.com)
Developed technology for “intelligent” in-socket electrical fault protection.
- 2001–2003** **Research Assistant**, Soft Condensed Matter Group, University of Waterloo, Ontario
Designed, constructed, and calibrated instruments to perform diffraction studies of fluids.

Teaching and Supervisory Experience

- 2023–2025** **Science Director & Instructor**, Adams County Christian Academy, Pennsylvania, USA
Developed and integrated quantum-informed science into core curriculum for grades 7 – 12.
- 2021–2023** **Invited Lecturer**, College of Medicine, Howard University, Washington, DC, USA
Contributed for-credit lecture to the College of Medicine’s “Grand Rounds” research seminar.
- 2019–2020** **M.Sc. Project Co-Supervisor**, Department of Physics, University of Exeter, UK
Designed, coordinated, advertised, and co-supervised M.Sc. research project in computer science.
- 2019** **Substitute Lecturer**, Department of Physics, University of Exeter, Devon, UK
Provided lecture and tutorial support to undergraduates learning mathematical physics.
- 2018** **Substitute Lecturer**, Chatham Christian Secondary School, Chatham, Ontario, Canada
Provided lecture and tutorial support to secondary school students learning mathematics.
- 2006–2010** **Research Project Supervisor** Institute for Biocomplexity & Informatics, University of Calgary
Conceived, developed, staffed, and supervised this undergraduate summer research internship.
- 2006–2010** **Teaching Assistant**, Department of Physics and Astronomy, University of Calgary, Canada
Assisted with undergraduate electromagnetism and electronics engineering laboratories.

Research Grants & Proposals

- 2025** National Science Foundation (NSF) Office of Advanced Cyberinfrastructure Core Research Program: “Distributed Algorithms and Software for Nonsymmetric Eigenvalue Problems in Physics, Chemistry, and Engineering.” Total grant value of **\$600 000 USD**, currently pending review by the NSF USA
- I conceived the original project concept, initiated the collaboration between Howard University, the University of Tennessee, and Umea University, and assisted in preparing the grant proposal.
- 2023** Sloan Foundation “Matter-to-Life” Grant valued at **\$1 000 000 USD** awarded to the Quantum Biology Laboratory at Howard University based on the original draft proposal by **N. S. Babcock *et al.***
- I conceived the original concept and was primary author of the initial manuscript for the project, although I moved on to devote myself to a new scientific program before the grant was awarded.
- 2021** U.S. Office of Naval Research Global (ONRG) grant for **\$611 000 USD** for the research project titled, “Spin biology under optimal quantum control,” awarded jointly to UCLA and the University of Exeter.
- I assisted with the scientific development and preparation of the proposal for this grant during my postdoctoral appointment at the Living Systems Institute at the University of Exeter, UK
- 2021** UK Engineering & Physical Sciences Research Council (EPSRC) grant for **£202 264 GBP** for the project, “Explaining the avian compass through sustained quantum dynamics in driven, open three-radical systems”
- I assisted with the scientific development and preparation of the proposal for this grant during my postdoctoral appointment at the Living Systems Institute at the University of Exeter, UK
- 2020** Leverhulme Trust Research Project Grant for **£226 604 GBP** awarded for the research project titled, “From butter to astronauts: magnetic field effects on lipid autoxidation,” at University of Exeter, UK
- I assisted with the scientific development and preparation of the proposal for this grant during my postdoctoral appointment at the Living Systems Institute at the University of Exeter, UK
- 2019** Defence Science and Technology Laboratory (Dstl) UK–France PhD program awarded **£100 000 GBP** grant jointly between the Living Systems Institute (LSI) at the University of Exeter, UK, the Centre National de la Recherche Scientifique (CNRS), and the University Paris-Saclay, France for the project titled, “Cryptochrome magnetoreception amplified by three-spin quantum correlation,” that entailed the education and training of highly-skilled personnel via the creation of a Ph.D. candidate position.
- I supported this international collaboration between Exeter and Paris by assisting with writing the project grant proposal, supervising the Ph.D. candidate, and reporting progress to Dstl.

Professional Service & Leadership

- 2025** **Scientific Grant Review Panelist**, Volkswagen Foundation, Hannover, Germany
- 2024** **Platform Session Chair**, Annual Meeting of the American Physical Society Mid-Atlantic Section Temple University, Philadelphia, Pennsylvania, USA (15 – 17 November 2024)
- 2023–2024** **Consultant Scientist**, Quantum Science, Technology, Engineering, Arts, & Mathematics Lab “Quantum STEAM Lab,” Rowen Elementary School, Philadelphia, Pennsylvania
- 2017** **Platform Session Chair**, 61st Biophysical Society Meeting, New Orleans, Louisiana, USA
- 2014** **Software Transition Coach**, Department of Physics and Astronomy, University of Calgary
- 2006** **Coordinator**, 3rd Canadian Quantum Information Students’ Conference, Calgary, Alberta
- 2003** **President**, Waterloo Physics Undergraduate Student Society, University of Waterloo, Ontario
- 2002–2003** **Editor-in-Chief**, *DarkMatter*, Waterloo Physics Undergraduate Student Society Newsletter
- 2001** **President**, Students’ Council, Saint Paul’s United College, University of Waterloo, Ontario

Awards & Scholarships

2023	International <i>Onion Prize</i> Research Competition (\$5 000 USD), The Guy Foundation, UK
2019	Outward Mobility Academic Fellowship Award (£1 800 GBP), University of Exeter, UK
2007–2010	NSERC Canada Graduate Scholarship D (\$105 000 CAD), University of Calgary, Alberta
2006	NSERC Canada Graduate Scholarship M (\$17 500 CAD), University of Calgary, Alberta
2006–2010	Alberta Ingenuity Scholarship in Nanotechnology (\$100 000 CAD), University of Calgary, Canada
2002–2005	NSERC Undergraduate Student Research Awards (\$13 500 CAD), University of Waterloo, Canada
2000–2003	Sir Isaac Newton Scholarship and Assistantships (\$4 200 CAD), University of Waterloo, Canada
2000	Miller Thompson Foundation Award (\$1 000 CAD), Wallaceburg District Secondary School, Canada

Peer-Reviewed Scientific Publications

N. S. Babcock, “[Open Quantum Systems Theory of Ultraweak Ultraviolet Photon Emissions: Revisiting Gurwitsch’s Onion Experiment as a Prototype for Quantum Biology](#),” *Comput. Struct. Biotech. J.* **26**, 78 (2024).

H. Patwa, **N. S. Babcock**, & P. Kurian, “[Quantum-enhanced photoprotection in neuroprotein architectures emerges from collective light-matter interactions](#),” *Front. Phys.* **12**, 1387271 (2024).

N. S. Babcock, G. Montes-Cabrera, K. E. Oberhofer, M. Chergui, G. L. Celardo, & P. Kurian, “[Ultraviolet Superradiance from Mega-Networks of Tryptophan in Biological Architectures](#),” *J. Phys. Chem. B* **128**, 4035 (2024).

N. S. Babcock & D. R. Kattnig, “[Radical scavenging could answer the challenge posed by electron–electron dipolar interactions in the cryptochrome compass model](#),” *J. Am. Chem. Soc. Au* **1**, 2033 (2021).

N. S. Babcock & D. R. Kattnig, “[Electron–Electron Dipolar Interaction Poses a Challenge to the Radical Pair Mechanism of Magnetoreception](#),” *J. Phys. Chem. Lett.* **11**, 2414 (2020).

A. de la Lande, **N. S. Babcock**, J. Řezáč, B. Lévy, B. C. Sanders, & D. R. Salahub, “[Quantum effects in biological electron transfer](#),” *Phys. Chem. Chem. Phys.* **14**, 5902 (2012).

N. Wiebe & **N. S. Babcock**, “[Improved error-scaling for adiabatic quantum evolutions](#),” *New J. Phys.* **14**, 013024 (2012).

A. de la Lande,* **N. S. Babcock**,* J. Řezáč, B. C. Sanders, & D. R. Salahub, “[Surface residues dynamically organize water bridges to enhance electron transfer between proteins](#),” *Proc. Natl. Acad. Sci.* **107**, 11799 (2010).
*Both these authors contributed equally to this work.

R. Stock, **N. S. Babcock**, M. G. Raizen, & B. C. Sanders, “[Entanglement of group-II-like atoms with fast measurement for quantum information processing](#),” *Phys. Rev. A* **78**, 022301 (2008).

N. S. Babcock, René Stock, Mark G. Raizen, & Barry C. Sanders, “[Entangling identical bosons in optical tweezers via exchange interaction](#),” *Can. J. Phys.* **86**, 549 (2008).

B. Nieman, X. Commeinhes, **N. S. Babcock**, I. Frola, R. Forgett, & S. H. J. Idziak, “[An x-ray confinement cell for studies of complex fluids under shear and confinement](#),” *Rev. Sci. Instrum.* **75**, 936 (2004).

M. Kisilak, H. Anderson, **N. S. Babcock**, M. R. Setzer, S. H. J. Idziak, & E. B. Sirota, “[An x-ray extensional flow cell](#),” *Rev. Sci. Instrum.* **72**, 4305 – 4307 (2001).

Books, Contributions, & Pre-Print Manuscripts

N. S. Babcock & B. N. Babcock, *Physical Principles of Quantum Biology*, World Scientific (2026).

N. S. Babcock & B. N. Babcock *Physical Principles of Quantum Biology*, arXiv pre-print 2503.11747 (2025). This first-of-its-kind technical monograph outlines the physical basis for the emerging field of quantum biology.

N. S. Babcock, “[Quantum research sheds new light on how cells communicate](#),” *Science X* Dialog featured on Phys.org, 23 December 2024.

N. S. Babcock, V. Salari, M. Aono, M. Levin, & P. Kurian, “From Light to Life: Self-Organization, Sensing, and Agency in *Physarum polycephalum*,” 18 November 2021. This original manuscript was later developed into a \$1 000 000 grant proposal, awarded in 2023 by the Alfred P. Sloan Foundation’s *Matter-to-Life* Program.

N. S. Babcock, David A. Sivak, Daniel A. Keedy, & James S. Fraser, “[Model Comparison to Identify Structural Heterogeneity in Protein X-Ray Crystallography](#),” *Biophys. J.* **112**, 486a (2017).

N. S. Babcock, David A. Sivak, Daniel A. Keedy, & James S. Fraser, “[Model Selection for Biological Crystallography](#),” bioRxiv pre-print 448795 (2017).

A. M. Souza, J. Zhang, C. A. Ryan, & R. Laflamme, “[Experimental magic state distillation for fault-tolerant quantum computing](#),” *Nat. Commun.* **2**, 169 (2011). **N. S. Babcock** acknowledged for contributions.

N. S. Babcock, “[Quantum Theory at Burning Man](#),” *The Quantum Times: Newsletter of the APS Division of Quantum Information* **3**, 1 – 3, 22 September 2008.

N. S. Babcock, “[Back to Baltimore](#),” *The Quantum Times: Newsletter of the APS Division of Quantum Information* **2**, 8 – 9, 22 May 2007.

N. S. Babcock, *Towards a Quantum Carnot Engine*, Undergraduate Project Thesis, 14 January 2005.

N. S. Babcock, “[The Impact of Quantum Information Science: 45 Years Later and Still Plenty of Room](#),” Institute for Quantum Information Science Undergraduate Essay Contest Winner, 1 December 2004.

Invited Research Seminars and Conference Presentations

18 May 2026 *Illuminating Ultraweak Photon Emissions for Quantum Nonlinear Biophotonics* (Invited)
American Society for Photobiology Meeting, Embassy Suites, Scottsdale, Arizona, USA
N. S. Babcock

13 April 2026 *Quantum Physics of Biology: Foundational Quantum Effects in Living Systems* (Keynote)
The Quantum Biology Forum, United Therapeutics, Silver Springs, Maryland, USA
N. S. Babcock

10 February 2026 *Physical Principles of Quantum Biology: Foundations to Applications* (Keynote)
Quantum Biology Kick-Off Event, Volkswagen Foundation, Hannover, Germany
N. S. Babcock

16 November 2025 *Physical Principles of Quantum Biology* (Contributed)
American Physical Society Mid-Atlantic Meeting, Penn State University, Harrisburg, USA
N. S. Babcock

23 April 2025 *Quantum Effects of Water Associated with Proteins – The Importance of Order* (Invited)
11th Guy Foundation Symposium on Water as a Quantum Biomolecule (online seminar)
N. S. Babcock

23 April 2025 *Living Quantum Matter: From Photons to Physiology* (Invited)
Lockheed Martin Corporation, North Bethesda, Maryland, USA
N. S. Babcock

Invited Research Seminars and Conference Presentations (continued)

- 21 March 2025 *Horizons of Quantum Biology: Mapping Out the Quantum Theory of Living Matter* (Invited)
APS Global Physics Summit, Anaheim Convention Center, California, USA
N. S. Babcock
- 3 March 2025 *Quantum Physics of Biology: From Photons to Physiology* (Invited)
Gordon Research Conference on Quantum Biology, Lucca, Italy
N. S. Babcock
- 17 November 2024 *Open Quantum Systems Theory of Ultraweak Ultraviolet Photon Emissions* (Contributed)
American Physical Society Mid-Atlantic Section Meeting, Temple University, Philadelphia
N. S. Babcock
- 10 October 2024 *Physical Foundations of Quantum Biology* (Invited)
“Big Quantum Biology Meetings” Virtual Online Seminar Series (UCLA / U. Surrey)
N. S. Babcock
- 17 November 2023 *Quantum Biology for Health and Medicine* (Invited)
International Symposium on Informational Biophysics Applied to Health, São Paulo, Brazil
N. S. Babcock
- 17 October 2023 *Electromagnetic Effects in Quantum Biology* (Invited)
Quantum Biology in Cancer Meeting, Cancer Research UK, London, UK
N. S. Babcock
- 22 June 2023 *Quantum Biology for Novel Therapies & Medicine* (Invited)
“Big Quantum Biology Meetings” Online Seminar Series (UCLA / University of Surrey)
N. S. Babcock, G. Montes-Cabrera, K. E. Oberhofer, M. Chergui, L. Celardo, P. Kurian
- 24 May 2023 *Collective Cooperative Quantum Effects: Synchronizing Cell Functions* (Invited)
4th Guy Foundation Symposium on Quantum Biology and Bioenergetics
N. S. Babcock, G. Montes-Cabrera, K. E. Oberhofer, M. Chergui, L. Celardo, P. Kurian
- 23 March 2023 *Collective and Cooperative Quantum Effects: Coordinating Cellular Function* (Invited)
Gordon Research Conference on Quantum Biology, Grand Galvez, Galveston, USA
N. S. Babcock
- 16 March 2023 *Introduction to Quantum Tunneling for Quantum Biology* (Invited)
Pre-Gordon Research Conference School on Quantum Biology (online)
N. S. Babcock
- 6 February 2023 *Physics or Metaphysics of Wavefunction Collapse?* (Invited)
Workshops on Biological Mentality, Michigan Technological University, USA
N. S. Babcock
- 31 January 2023 *Quantum Biology for Novel Therapies & Medicine* (Invited)
Howard University College of Medicine, Washington, District of Columbia, USA
N. S. Babcock, G. Montes-Cabrera, K. E. Oberhofer, M. Chergui, L. Celardo, P. Kurian
- 26 January 2023 *All Things Quantum: Entanglement at the Forefront of the Life Sciences* (Invited)
Quantum Sciences Lecture Series, Quantum Biology Lab, Howard University, Washington, DC
N. S. Babcock for Vlatko Vedral
- 29 September 2022 *Microtubule Superradiance May Facilitate Cellular Communication* (Invited)
“Big Quantum Biology Meetings” Online Seminar Series (UCLA / University of Surrey)
N. S. Babcock for Giuseppe Luca Celardo

Invited Research Seminars and Conference Presentations (continued)

- 18 November 2021 *Photonic Cooperativity & Coherence in Microtubule Architectures* (Contributed)
Joint Conference of the African Light Source, African Physical Society (15 – 19 November 2021)
N. S. Babcock, G. Montes-Cabrera, K. E. Oberhofer, M. Chergui, L. Celardo, P. Kurian
- 17 November 2021 *Towards a Global Quantum Internet & Beyond* (Invited)
4th Guy Foundation Symposium on Quantum Biology and Bioenergetics
N. S. Babcock for Christoph Simon
- 16 November 2021 *Microtubule Superradiance May Facilitate Cellular Communications* (Grand Rounds)
Howard University College of Medicine, Washington, District of Columbia, USA
N. S. Babcock, G. Montes-Cabrera, K. E. Oberhofer, M. Chergui, L. Celardo, P. Kurian
- 3 November 2021 *Cryptochrome Blue Light Photoreceptors & Photocycles* (Invited)
4th Guy Foundation Symposium on Quantum Biology and Bioenergetics
N. S. Babcock for Margaret Ahmad
- 9 March 2021 *Photonic Cooperativity and Coherence: From Cytoskeleton to Centriole* (Contributed Poster)
National Academy of Sciences Workshop on Quantum Technology for Biology (online workshop)
N. S. Babcock, G. Montes-Cabrera, K. E. Oberhofer, M. Chergui, L. Celardo, P. Kurian
- 10 December 2019 *Chemical Magnetoreception in Biological Systems* (Invited)
Physics Department, Brock University, Saint Catharines, Ontario, Canada
N. S. Babcock with D. R. Kattnig
- 31 October 2019 *Time Reversal and the Measurement Problem* (Invited)
Quantum Theory Research Group, University of Exeter, Devon, UK
N. S. Babcock
- 18 September 2019 *On Resolving the Spooky Problem of Measurement* (Invited)
Frontiers of Quantum Thermodynamics Conference, Devon, UK
N. S. Babcock
- 24 August 2019 *Interplay Between Dipolar and Hyperfine Couplings in Model Spin Systems* (Contributed Poster)
International Spin Chemistry Meeting, Saint Petersburg, Russia
N. S. Babcock with D. R. Kattnig
- 24 July 2019 *Spin Chemical Magnetic Sensing in Living Systems* (Invited)
Department of Physics and Astronomy, University of Exeter, UK
N. S. Babcock and D. R. Kattnig
- 5 July 2019 *Magnetic Sensing in Living Systems using Spin Chemical Dynamics* (Contributed)
Meeting of the Society for Experimental Biology, Seville, Spain
N. S. Babcock with D. R. Kattnig
- 7 March 2019 *Quantum Biology of Magnetoreception* (Invited)
The Institute of Photonic Sciences (ICFO), Barcelona, Catalonia, Spain
N. S. Babcock and D. R. Kattnig
- 5 March 2019 *Quantum Biology of Magnetoreception* (Invited)
Grup d'Informació Quàntica, Universitat Autònoma de Barcelona, Catalonia, Spain
N. S. Babcock and D. R. Kattnig
- 15 February 2017 *Model Comparison to Identify Structural Heterogeneity in Protein X-ray Crystallography* (Contributed)
61st Annual Meeting of the Biophysical Society (11 – 15 February 2017), New Orleans, Louisiana
N. S. Babcock, D. A. Sivak, D. Keedy, J. S. Fraser

Invited Research Seminars and Conference Presentations (continued)

- 14 June 2016 *Model Comparison in Structural Biology* (Invited)
Department of Biological Sciences, University of Calgary, Calgary, Alberta, Canada
N. S. Babcock, D. A. Keedy, D. A. Sivak, J. S. Fraser
- 16 March 2015 *A molecular breakwater enhances electron transfer between proteins* (Invited)
Department of Physics, Simon Fraser University, Burnaby, British Columbia, Canada
N. S. Babcock, A. de la Lande, J. Řezáč, B. C. Sanders, D. R. Salahub
- 31 January 2015 *Born-Oppenheimer Breakdown* (Invited)
6th Annual Kananaskis Computational Biology Symposium, Alberta, Canada
N. S. Babcock, E. Zahedinejad, J. Johannes, B. C. Sanders
- 3 March 2014 *A molecular breakwater enhances electron transfer between proteins* (Invited)
Center for Molecular Simulation, University of Calgary, Calgary, Alberta, Canada
N. S. Babcock, A. de la Lande, J. Řezáč, B. C. Sanders and D. R. Salahub
- 1 February 2014 *The Thermodynamic Foundation of Marcus Theory* (Invited)
5th Annual Kananaskis Computational Biology Symposium, Alberta, Canada
N. S. Babcock
- 29 April 2013 *Conformationally enhanced electron transfer between proteins* (Invited)
Center for Molecular Simulation, University of Calgary, Calgary, Alberta, Canada
N. S. Babcock, A. de la Lande, J. Řezáč, B. C. Sanders, D. R. Salahub
- 26 January 2013 *Complexity of Nonadiabatic Reaction Kinetics: Understanding the Franck-Condon Factor* (Invited)
4th Annual Kananaskis Computational Biology Symposium, Alberta, Canada
N. S. Babcock
- 28 January 2012 *Biological Electron Transfer* (Invited)
3rd Annual Kananaskis Computational Biology Symposium, Alberta, Canada
N. S. Babcock, A. de la Lande, J. Řezáč, B. C. Sanders, D. R. Salahub
- 23 March 2011 *A molecular breakwater enhances electron transfer between proteins* (Contributed)
American Physical Society March Meeting, Dallas, Texas, USA
N. S. Babcock, A. de la Lande, J. Řezáč, B. C. Sanders, D. R. Salahub
- 3 February 2011 *Electron Transfer Between Proteins* (Invited)
2nd Annual Kananaskis Computational Biology Symposium, Alberta, Canada
N. S. Babcock, A. de la Lande, J. Řezáč, B. C. Sanders, D. R. Salahub
- 14 July 2010 *Water-Mediated Electron Transfer Between Proteins* (Contributed Poster)
Canadian Quantum Information Students' Conference, Calgary, Alberta
N. S. Babcock, A. de la Lande, J. Řezáč, B. C. Sanders, D. R. Salahub
- 10 May 2010 *Water-mediated Electron Transfer Between Proteins* (Contributed Poster)
Workshop on Theoretical, Computational, and Experimental Challenges to Exploring Coherent Quantum Dynamics in Complex Many-Body Systems (9 – 12 May 2010), Dublin, Ireland
N. S. Babcock, A. de la Lande, J. Řezáč, B. C. Sanders, D. R. Salahub
- 23 January 2010 *A Molecular Breakwater for Interprotein Electron Transport* (Invited)
1st Annual Kananaskis Computational Biology Symposium, Alberta, Canada
N. S. Babcock, A. de la Lande, D. R. Salahub, B. C. Sanders
- 26 May 2009 *Electron Superhighways and Bridges in Protein Complexes* (Invited)
Canadian Institute for Advanced Research, Meeting on Quantum Information Processing
N. S. Babcock, A. de la Lande, D. Salahub, B. C. Sanders

Invited Research Seminars and Conference Presentations (continued)

- 25 March 2009 *Bioelectric Motors: Bridging the Gap* (Invited)
Institut für Theoretische Physik, Universität Innsbruck, Austria
N. S. Babcock, A. de la Lande, D. R. Salahub, B. C. Sanders
- 25 February 2009 *Living Quantum Engines* (Invited)
Quantum Nanoscience Group, University of Queensland, Brisbane, Australia
N. S. Babcock, A. de la Lande, D. R. Salahub, B. C. Sanders
- 18 February 2009 *Living Quantum Engines* (Invited)
University of Sydney, Quantum Information Theory @ Sydney, Sydney, Australia
N. S. Babcock, A. de la Lande, D. R. Salahub, B. C. Sanders
- 12 January 2009 *Living Quantum Engines* (Invited)
First Workshop on Quantum Technology in Biological Systems
National University of Singapore / Sentosa Resort, Republic of Singapore
N. S. Babcock, A. de la Lande, D. R. Salahub, B. C. Sanders
- 17 June 2008 *Coherent & Incoherent Electron Transfer in Biological Systems* (Contributed)
5th Canadian Quantum Information Students' Conference (15 – 21 June 2008)
Université de Montréal, Quebec, Canada, *Awarded First Place for "Best Talk"*
N. S. Babcock, A. de la Lande, D. R. Salahub, B. C. Sanders
- 7 June 2007 *Entangling neutral atoms with symmetrization-dependent dynamics* (Contributed Poster)
38th Meeting of the Division of Atomic, Molecular and Optical Physics (5 – 9 June 2007)
Calgary, Alberta, Canada, <http://meetings.aps.org/link/BAPS.2007.DAMOP.K1.25>
N. S. Babcock, R. Stock, M. G. Raizen, B. C. Sanders
- 2 June 2007 *Entangling neutral atoms in optical dipole traps* (Contributed Poster)
4th Annual Canadian Quantum Information Students' Conference
Perimeter Institute, University of Waterloo, Ontario, Canada
N. S. Babcock, R. Stock, B. C. Sanders, M. G. Raizen
- 10 May 2007 *Entanglement and Rapid Measurement of Clock-State Qubits in Yb or Sr for Quantum Information Processing* (Contributed)
Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference
CLEO/QELS (6 – 11 May 2007), Baltimore, Maryland, USA
N. S. Babcock, R. Stock, M. G. Raizen, B. C. Sanders
- 3 May 2007 *Entangling Neutral Atoms in Optical Dipole Traps for a Loophole-Free Bell Inequality Test* (Invited)
Canadian Institute for Advanced Research meeting on Quantum Information Processing
The Fairmont Newfoundland, Saint John's, Newfoundland, Canada
N. S. Babcock, R. Stock, B. C. Sanders, M. Raizen
- 18 February 2007 *Rapid control and measurement of clock-state qubits in Yb and Sr* (Contributed)
9th Annual Southwest Quantum Information and Technology Meeting
California Institute of Technology, Pasadena, California, USA
N. S. Babcock, R. Stock, M. G. Raizen, B. C. Sanders
- 29 September 2006 *Rapid control and measurement of clock-state qubits in Yb and Sr* (Invited)
Institute for Quantum Computing, University of Waterloo, Ontario, Canada
N. S. Babcock, R. Stock, M. G. Raizen, B. C. Sanders
- 10 August 2005 *"Magic State" Distillation: Filling Our Quantum Toolshelf* (Contributed)
1st Annual Canadian Quantum Information Students' Conference (8 – 12 August 2005)
Institute for Quantum Information Science, University of Calgary, Alberta, Canada
N. S. Babcock with R. Laflamme

Science Workshops and Public Outreach

- 20 June 2019 *How do Living Systems Sense Magnetic Fields?* (Public Outreach Lecture)
Open House Night, Living Systems Institute, University of Exeter, UK
N. S. Babcock and D. R. Kattnig
- 24 May 2019 *Quantum Theory of the Magnetic Sense* (Public Outreach Lecture)
Ugbrooke House and Gardens, Chudleigh, Devon, UK
N. S. Babcock
- 26 July 2017 *Quantum Physics of Life: The Limits of Entanglement* (Invited Annual Workshop)
Motion Notion (24 – 28 July 2017), Beaverfoot Lodge, Golden, British Columbia, Canada
N. S. Babcock
- 23 July 2016 *Quantum Physics of Life: How Do Cells Breathe?* (Invited Annual Workshop)
Motion Notion (21 – 25 July 2016), Beaverfoot Lodge, Golden, British Columbia, Canada
N. S. Babcock
- 25 July 2015 *Physics of Thin Films and Giant Bubbles* (Invited Annual Workshop)
Motion Notion (23 – 27 July 2015), Beaverfoot Lodge, Golden, British Columbia, Canada
N. S. Babcock with K. Farynowski and E. Hintz
- 26 July 2014 *“Bending” Water: Physics of Tunable Beat Frequencies* (Invited Annual Workshop)
Motion Notion (24 – 28 July 2014), Beaverfoot Lodge, Golden, British Columbia, Canada
N. S. Babcock
- 27 July 2013 *Complex Fluids and Biomechanics of Anatomy and Physiology* (Invited Annual Workshop)
Motion Notion (25 – 29 July 2013), Beaverfoot Lodge, Golden, British Columbia, Canada
N. S. Babcock
- 21 July 2012 *Rocket Science: Bernoulli’s Principle and More!* (Invited Annual Workshop)
Motion Notion (19 – 23 July 2012), Beaverfoot Lodge, Golden, British Columbia, Canada
N. S. Babcock with P. Winter
- 16 July 2011 *Introduction to General Relativity* (Invited Annual Workshop)
Motion Notion (14 – 18 July 2011), Bent River Ranch, Drayton Valley, Alberta, Canada
N. S. Babcock
- 17 July 2010 *Quantum Physics of Quantum Computing* (Invited Annual Workshop)
Motion Notion (15 – 19 July 2010), Bent River Ranch, Drayton Valley, Alberta, Canada
N. S. Babcock
- 1 September 2009 *Quantum Theory @ MathCamp* (Invited Workshop)
Burning Man (31 August – 7 September 2009), Black Rock City, Nevada, USA
N. S. Babcock
- 17 July 2009 *Quantum Physics of Quantum Cryptography* (Invited Annual Workshop)
Motion Notion (16 – 19 July 2009), Bent River Ranch, Drayton Valley, Alberta, Canada
N. S. Babcock
- 27 August 2008 *Quantum Theory @ MathCamp* (Invited Workshop)
Burning Man (25 August – 1 September 2008), Black Rock City, Nevada, USA
N. S. Babcock
- 19 July 2008 *Quantum Theory of Teleportation* (Invited Annual Workshop)
Motion Notion (17 – 20 July 2008), Bent River Ranch, Drayton Valley, Alberta, Canada
N. S. Babcock