

Kurt JACOBS

Contact Information **Address** Department of Physics **Phone** (617) 287-6044
Umass Boston **Fax** (617) 578-6053
100 Morrissey Blvd. **Email** kurt.jacobs@umb.edu
Boston, MA 02125

Educational History

- 1995 - 1998 **PhD in Physics, Imperial College, London** (Advisor: Prof. Sir Peter Knight)
Thesis: Topics in Quantum Measurement and Quantum Noise
Supporting Scholarship: Commonwealth
- 1993 - 1994 **MSc in Physics, University of Auckland**, (Advisor: Prof. Daniel F. Walls)
Thesis: Force Measurement via Dark State Cooling
Prizes: Fowlds Memorial Prize, Deans Prize, Siechi Waki Prize
- 1990 - 1992 **BSc, University of Auckland** (major in Physics),
Prizes and Scholarships: Annual Prize in Physics, Senior Scholarship

Professional History

- 2011 - **University of Massachusetts at Boston**
Associate Professor (tenured)
- 2008 - **Louisiana State University**
Adjunct Assistant Professor
- 2006 - 2011 **University of Massachusetts at Boston**
Assistant Professor
- 2005 - 2006 **Louisiana State University**
Postdoctoral Researcher
- 2003 - 2005 **Griffith University, Brisbane**
Postdoctoral Researcher and Lecturer
- 2002 - 2003 **Artabel, SA, France**
Research and Development in Computational Finance
- 1999 - 2002 **Los Alamos National Laboratory**
Postdoctoral Research Associate and High Performance Computing Fellow

Teaching Experience

- 2006 - **University of Massachusetts at Boston**
Taught 2 freshman, 1 sophomore, 2 senior, and 1 graduate class.
- 2003 - 2005 **Griffith University, Brisbane**
Taught sophomore optics, sophomore electromagnetism, and part of a class for general majors entitled "Life, the Universe, and Everything"
- 1996 - 1998 **Imperial, London**
TA for laboratories and tutorials
- 1993 - 1995 **University of Auckland, New Zealand**
Supervisor and TA for laboratory classes.

References for Kurt JACOBS

Prof. Gerard J. Milburn, milburn@physics.uq.edu.au

Department of Physics,
The University of Queensland,
St Lucia, QLD 4072
Australia
Ph. +61 7 3365 6931
Fax. +61 7 3346 1214

Prof. Jonathan P. Dowling, jdowling@lsu.edu

Hearne Institute for Theoretical Physics,
Department of Physics & Astronomy
Louisiana State University
202 Nicholson Hall, Tower Drive
Baton Rouge, LA 70803-4001
USA
Ph. +1 225 578 0887
Fax. +1 225 578 5855

Prof. Vlatko Vedral, vlatko.vedral@qubit.org

Department of Atomic & Laser Physics
Clarendon Laboratory
University of Oxford
Parks Road
Oxford
OX1 3PU
Ph: +1865 (2)72389

Assoc. Prof. Daniel Steck, dan@steck.us

Department of Physics
1274 University of Oregon
Eugene, OR 97403-1274
USA
Ph. +1 541 346 5313
Fax. +1 541 346 5861

Prof. Jason Ralph, jfralph@liverpool.ac.uk

University of Liverpool
Department of Electrical Engineering and Electronics
Brownlow Hill
Liverpool L69 3GJ
UK
Ph. +44-151-794-4531

Prof. Howard M. Wiseman, h.wiseman@griffith.edu.au

School of Science
Griffith University
Nathan 4111
Australia
Ph. +61 7 3875 7271
Fax. +61 7 3875 7656

Peer-Reviewed Publications – Overview

(Citation data is from ISI Web of Science as of 9/5/2013)

Total number: 77

h-index: 24 Total number of citations: 2,120

Top 26 cited articles

Citations	Article
214	Doherty and Jacobs, PRA 60, 2700 (1999).
178	Doherty, Habib, Jacobs, Mabuchi and Tan, PRA 62, 012105 (2000).
165	Eisert, Jacobs, Papadopoulos and Plenio, PRA 62, 052317 (2000).
153	Bose, Jacobs and Knight, PRA 56, 4175 (1997).
133	Vedral, Plenio, Jacobs and Knight, PRA 56, 4452 (1997).
105	Bose, Jacobs and Knight, PRA 59, 3204 (1999).
84	Hopkins, Jacobs, Habib, and Schwab, PRB 68, 235328 (2003).
74	Jacobs and Steck, CP 47, 279 (2006).
67	Milburn, Jacobs and Walls, PRA 50, 5256 (1994).
64	Bhattacharya, Habib and Jacobs, PRL 85, 4852 (2000).
59	Jacobs, Tombesi, Collett and Walls, PRA 49 1961 (1994).
59	Doherty, Jacobs, and Jungman, PRA 63, 062306 (2001).
58	Fuchs and Jacobs, PRA 63, 062305 (2001).
52	Steck, Jacobs, Mabuchi, Bhattacharya, and Habib, PRL 92, 223004 (2004).
47	Clerk, Marquardt, and Jacobs, NJP 10, 095010 (2008)
46	Jacobs, Tittonen, Wiseman, and Schiller, PRA 60, 538 (1999).
44	Jacobs, PRA 67, 030301(R) (2003).
36	Combes and Jacobs, PRL 96, 010504 (2006).
30	Jacobs, Lougovski, and Blencowe, PRL 98, 147201 (2007).
28	Sarovar, Ahn, Jacobs, and Milburn, PRA 69, 052324 (2004).
27	Habib, Jacobs, Mabuchi, Ryne, Shizume, and Sundaram, PRL 88, 040402 (2002).
27	Jacobs and Knight, PRA 57, 2301 (1998).
26	Habib, Jacobs, and Shizume, PRL 96, 010403 (2006).
25	Jacobs, PRL 99, 117203 (2007).
22	Steck, Jacobs, Mabuchi, Habib, and Bhattacharya, PRA 74, 012322 (2006)
20	Jacobs and Lund, PRL 99, 020501 (2007)

Grants Awarded

NSF PHY-0902906 (Sole PI)

3 years, 210k, 2009-2012 (Awarded 9/1/09)

NSF PHY-1005571 (Co-PI, with PI Fred Strauch, Williams College)

3 years, 233k, 2010-2013 (Awarded 8/25/10)

IARPA Quantum Computer Science Project (Key Personnel)

4-year, multi-institution grant, including Telcordia, LSU, Penn. State, UMB
Funding to UMB: \$604k (Awarded 8/1/2011)

ARO MURI: Control of Open Quantum Systems: Theory and Experiment (Co-PI)

5-year, multi-institution grant, including USC, UCR, Princeton, UMB
Estimated total funding: \$6.25M Funding to UMB: \$497k (Awarded 8/1/2011)

NSF PHY-1212413 (PI, with Co-PI Fred Strauch, Williams College)

3-years, 180k, 2012-2015 (Awarded 9/1/12)

Press coverage

- 2012** Ron Dickman, "No free lunch, or measurements", synopsis in Physics, Nov 15 (2012) summarizes K. Jacobs, Phys. Rev. E 86, 040106(R) (2012); <http://physics.aps.org/synopsis-for/10.1103/PhysRevE.86.040106>
- 2011** D. Shiga, "Cruelty-Free Quantum Probes", New Scientist, issue 2810, p. 8 (May 30th, 2011). presents the work in K. Jacobs, S. Vinjanampathy, and J. Finn, "Real-time feedback control of a mesoscopic superposition", Phys. Rev. A. **83**, 041801(R) (2011).
- 2011** Quoted in D. Shiga, "Quantum upgrade removes need for spooky observer", New Scientist, issue 2836 (Oct 27, 2011)
- 2006** J. Roebke, "Quantum Pulp: Some physics is just crime fiction with math." SEED Magazine (New York) 2, 5 (June/July 2006), p. 31. prominently features K. Jacobs and H. M. Wiseman, "An entangled web of crime: Bell's theorem as a short story", Am. J. Phys **73**, 932-937 (2005).

Book in preparation

Quantum Measurement Theory and its Applications

K. Jacobs (Cambridge University Press, under contract, delivery date Nov 2013)

Publications

Books

Stochastic Processes for Physicists: Understanding Noisy Systems

K. Jacobs (Cambridge University Press, Cambridge, 2010)

Peer-Reviewed Journal Articles

Nature Journals

An exactly solvable model for the integrability–chaos transition in rough quantum billiards

M. Olshanii, K. Jacobs, M. Rigol, V. Dunjko, H. Kennard, V. Yurovsky, Nat. Commun. 3:641 doi: 10.1038/ncomms1653 (2012).

Physical Review Letters

Absolute Dynamical Limit to Cooling weakly-Coupled quantum Systems

X. Wang, S. Vinjanampathy, F. W. Strauch, and K. Jacobs, PRL 110, 157207 (2013)

Ultra-Efficient Cooling of Resonators: Beating Sideband Cooling with Quantum Control

X. Wang, S. Vinjanampathy, F. W. Strauch, and K. Jacobs, PRL 107, 177204 (2011)

Arbitrary Control of Entanglement Between two superconducting resonators

F. W. Strauch, K. Jacobs, and R. W. Simmonds, PRL 105, 050501 (2010)

Engineering Giant Nonlinearities in Quantum Nano-Systems

K. Jacobs and A. J. Landahl, PRL 103, 067201 (2009)

Comment on "Non-monotonicity in the Quantum-Classical Transition: Chaos Induced by Quantum Effects"

J. Finn, K. Jacobs and Bala Sundaram, PRL 102, 119401 (2009)

Engineering Superposition States and Tailored Probes for Nanoresonators via Open-Loop Control

K. Jacobs, L. Tian, and J. Finn, PRL 102, 057208 (2009)

Locally Optimal Control of Quantum Systems with Strong Feedback

A. Shabani and K. Jacobs, PRL 101, 230403 (2008)

Rapid Measurement of Quantum Systems Using Feedback Control

J. Combes, H. M. Wiseman, and K. Jacobs, PRL 100, 160503 (2008)

Engineering Quantum States of a Nanoresonator via a Simple Auxiliary System

K. Jacobs, PRL 99, 117203 (2007) (Cover Article, Sept. 14)

Feedback Control of Non-linear Quantum Systems: a Rule of Thumb

K. Jacobs and A. P. Lund, PRL 99, 020501 (2007)

Continuous Measurement of the Energy Eigenstates of a Nano-Mechanical Resonator Without a Non-Demolition Probe

K. Jacobs, P. Lougovski and M. Blencowe, PRL 98, 147201 (2007)

Rapid State-Reduction of Quantum Registers Using Feedback Control

J. Combes and K. Jacobs, PRL 96, 010504 (2006)

Emergence of Chaos in Quantum Systems Far from the Classical Limit

S. Habib, K. Jacobs and K. Shizume, PRL 96, 010403 (2006)

Quantum Feedback Control of Atomic Motion in an Optical Cavity

D.A. Steck, K. Jacobs, H. Mabuchi, S. Habib and T. Bhattacharya, PRL 92, 223004 (2004)

The quantum-classical transition in non-linear dynamical systems

S. Habib, K. Jacobs, H. Mabuchi, R. Ryne, K. Shizume and B. Sundaram, PRL 88, 040402 (2002)

Continuous quantum measurement and the emergence of classical chaos

T. Bhattacharya, S. Habib and K. Jacobs, PRL 85, 4852-4855 (2000)

Pedagogical and Review Articles

Quantum Feedback Control: How to Use Verification Theorems and Viscosity Solutions to Find Optimal Protocols

K. Jacobs and A. Shabani, Contemporary Physics 49, 435 (2008)

A Straightforward Introduction to Continuous Quantum Measurement

K. Jacobs and D.A. Steck, Contemporary Physics 47, 279 (2006)

An Entangled Web of Crime: Bell's Theorem as a Short Story

K. Jacobs and H.M. Wiseman, Am. J. Phys. 73, 932 (2005)

Rapid/Fasttrack Communications

Quantum measurement and the first law of thermodynamics: the energy cost of measurement is the work value of the acquired information

K. Jacobs, Phys. Rev. E 86, 040106(R) (2012);

synopsis in Physics: <http://physics.aps.org/synopsis-for/10.1103/PhysRevE.86.040106>

Real-time feedback control of a mesoscopic superposition

K. Jacobs, J. Finn, and S. Vinjanampathy, Phys. Rev. A 83, 041801(R) (2011)

Emergent quantum jumps in a nano-electro-mechanical system

K. Jacobs and P. Lougovski, J. Phys. A: Math Theor. 40, F987 (2007)

Readout of solid-state charge qubits using a single-electron pump

C. Hines, K. Jacobs, and J. B. Wang, J. Phys. A: Math. Theor. 40, F609 (2007)

How to Project Qubits Faster Using Quantum Feedback

K. Jacobs, Phys. Rev. A 67, 030301(R) (2003)

Conditional Probabilities for a Single Photon at a Beam Splitter

K. Jacobs and P.L. Knight, Phys Rev. A 54, 3738(R) (1996).

Regular Articles (49)

Error-transparent evolution: the ability of multi-body interactions to bypass decoherence

- O. Vy, X. Wang, and K. Jacobs, *New J. Phys.* **15**, 053002 (2013)
- Non-Markovian quantum input-output networks**
J. Zhang, Y.-X. Liu, R.-B. Wu, K. Jacobs, and F. Nori, *Phys. Rev. A* **87**, 032117 (2013)
- Numerical method for finding decoherence-free subspaces and its applications**
X. Wang, M. Byrd, and K. Jacobs, *Phys. Rev. A* **87**, 012338 (2013)
- Entangled-state synthesis for superconducting resonators**
F. W. Strauch, D. Onyango, K. Jacobs, and R. W. Simmonds, *Phys. Rev. A* **85**, 022335 (2012)
- Approach to typicality in many-body quantum systems**
S. Dubey, L. Silvestri, J. Finn, S. Vinjanampathy, and K. Jacobs, *Phys. Rev. E* **85**, 011141 (2012)
- Frequency tracking and parameter estimation for robust quantum state estimation**
J. F. Ralph, K. Jacobs, and C. D. Hill, *Phys. Rev. A* **84**, 052119 (2011)
- Engineering quantum states, nonlinear measurements and anomalous diffusion by imaging**
K. Jacobs and D. A. Steck, *New J. Phys.* **13**, 013016 (2011)
- Reflection of a Particle from a Quantum Measurement**
J. B. Mackrory, K. Jacobs, and D. A. Steck, *New J. Phys.* **12**, 113023 (2010)
- Rapid purification of quantum systems by measuring in a feedback-controlled unbiased basis**
J. Combes, H. M. Wiseman, K. Jacobs, and A. J. O'Connor, *Phys. Rev. A* **82**, 022307 (2010)
- Wave-function Monte Carlo method for simulating conditional master equations**
K. Jacobs, *Phys. Rev. A* **81**, 042106 (2010)
- Feedback Control Using Only Quantum Back-Action**
K. Jacobs, *New J. Phys.* **12**, 043005 (2010)
- Second Law of Thermodynamics and Quantum Feedback Control: Maxwell's Demon with Weak Measurements**
K. Jacobs, *Phys. Rev. A* **80**, 012322 (2009)
- Quantum Manipulation of Low-Frequency Fluctuators by Superconducting Resonator**
L. Tian and K. Jacobs, *Phys. Rev. A* **79**, 144503 (2009)
- A Controllable Interaction between Two-Level Systems inside a Josephson Junction**
L. Tian and K. Jacobs, *IEEE. T. Appl. Supercon.* **19**, 953-956 (2009).
- The Equations of Quantum Feedback Control in the Regime of Good Control**
J. Li and K. Jacobs, *Quantum Inform. Compu.* **9**, 395 (2009)
- A Monte Carlo method for modeling thermal damping: Beyond the Brownian motion master equation**
K. Jacobs, *EPL* **85**, 40002 (2009)
- Back-action Evasion and Squeezing of a Mechanical Resonator Using a Cavity Detector**
A. A. Clerk, F. Marquardt, and K. Jacobs, *New. J. Phys.* **10**, 095010 (2008)
- Trade-off between extractable mechanical work, accessible entanglement, and ability to act as a reference system, under arbitrary superselection rules**
J. A. Vaccaro, F. Anselmi, H. M. Wiseman, and K. Jacobs, *Phys. Rev. A* **77**, 032114 (2008)
- Energy measurements and preparation of canonical phase states of a nanomechanical resonator**
K. Jacobs, A. N. Jordan and E. K. Irish, *Europhys. Lett.* **82**, 18003 (2008)
- Rapid-Purification Protocols for Optical Homodyning**
A. Chiruvelli and K. Jacobs, *Phys. Rev. A* **77**, 012102 (2008)
- Conditions for the quantum-to-classical transition: Trajectories versus phase-space distributions**
B. Greenbaum, K. Jacobs and B. Sundaram, *Phys. Rev. E* **76**, 036213 (2007)
- Quantum communication via a continuously monitored dual spin chain**
K. Shizume, K. Jacobs, D. Burgarth and S. Bose, *Phys. Rev. A* **75**, 062328 (2007)
- Rapid state-purification protocols for a Cooper-pair box**
E. J. Griffith, C. D. Hill, J. F. Ralph, H. M. Wiseman, and K. Jacobs, *Phys. Rev. B* **75**, 014511 (2007)
- Feedback control for communication with non-orthogonal states**
K. Jacobs, *Quantum Inform. Compu.* **7**, 127 (2007)
- Feedback cooling of atomic motion in cavity QED**
D.A. Steck, K. Jacobs, H. Mabuchi, S. Habib and T. Bhattacharya, *Phys. Rev. A* **74**, 012322 (2006)

- A bound on the mutual information, and properties of entropy reduction, for quantum channels with inefficient measurements**
K. Jacobs, J. Math. Phys. 47, 012102 (2006)
- Classical Robustness of Quantum Unravellings**
D.J. Atkins, Z. Brady, K. Jacobs and H.M. Wiseman, Europhysics Lett. 69, 163 (2005)
- A practical scheme for error control using feedback**
M. Sarovar, C. Ahn, K. Jacobs, G.J. Milburn, Phys. Rev. A 69, 052324 (2004)
- Feedback Cooling of a Nano-Mechanical Resonator**
A. Hopkins, K. Jacobs, S. Habib and K. Schwab, Phys. Rev. B 68, 235328 (2003)
- Recovering Classical Dynamics from Coupled Quantum Systems through Continuous Measurement**
S. Ghose, P. Alsing, I. Deutsch, T. Bhattacharya, S. Habib and K. Jacobs, Phys. Rev. A 67, 052102 (2003)
- Continuous Quantum Measurement and the Quantum to Classical Transition**
T. Bhattacharya, S. Habib and K. Jacobs, Phys. Rev. A 67, 042103 (2003)
- How Do Two Observers Pool Their Knowledge About a Quantum System?**
K. Jacobs, Quantum Information Processing 1, 73 (2002)
- The Delta-Kicked Rotor: Momentum Diffusion and the Quantum-Classical Boundary**
T. Bhattacharya, S. Habib, K. Jacobs and K. Shizume, Phys. Rev. A 65, 032115 (2002)
- Information, disturbance and Hamiltonian quantum feedback control**
A. Doherty, K. Jacobs and G. Jungman, Phys. Rev. A 63, 062306 (2001)
- Information-tradeoff relations for finite-strength quantum measurements**
C. Fuchs and K. Jacobs, Phys. Rev. A 63, 062305 (2001)
- Optimal local implementation of non-local quantum gates**
J. Eisert, K. Jacobs, P. Papadopoulos and M.B. Plenio, Phys. Rev. A 62, 052317 (2000)
- Robust control in the quantum domain**
A. Doherty, John Doyle, K. Jacobs, S. Habib and H. Mabuchi, Proceedings of the IEEE Conference on Decision and Control, vol.1, 949-954 (2000)
- Quantum feedback control and classical control theory**
A. Doherty, S. Habib, K. Jacobs, H. Mabuchi and S.M. Tan, Phys. Rev. A 62, 012105 (2000)
- Feedback-control of quantum systems using continuous state-estimation**
A. Doherty and K. Jacobs, Phys Rev. A 60, 2700-2710 (1999)
- Quantum noise in the position measurement of a cavity mirror undergoing Brownian motion**
K. Jacobs, I. Tittonen, H.M. Wiseman and S. Schiller, Phys Rev. A 60, 538-548 (1999)
- A scheme to probe the decoherence of a macroscopic object**
S. Bose, K. Jacobs and P.L. Knight, Phys Rev. A 59, 3204-3210 (1999)
- Linear quantum trajectories: applications to continuous projection measurements**
K. Jacobs and P.L. Knight, Phys Rev. A 57, 2301-2310 (1998)
- Statistical inference, distinguishability of quantum states, and quantum entanglement**
V. Vedral, M. B. Plenio, K. Jacobs and P.L. Knight, Phys Rev. A 56, 4452-4455 (1997)
- Preparation of non-classical states in a cavity with a moving mirror**
S. Bose, K. Jacobs and P.L. Knight, Phys Rev. A 56, 4175 (1997)
- Determining the State of a Single Cavity Mode from Photon Statistics**
K. Jacobs, P.L. Knight and V. Vedral, J. Mod. Opt., 44, 2427-2439 (1997).
- A Model for the Production of Regular Fluorescent Light from Coherently Driven Atoms**
K. Jacobs, J. Mod. Opt. 44, 1475-1484 (1997)
- Force Measurement via Dark State Cooling**
K. Jacobs, M.J. Collet, H.M. Wiseman, S.M. Tan and D.F. Walls, Phys. Rev. A 54, 2260 (1996).
- Quantum Limited Measurements with the Atomic Force Microscope**
G.J. Milburn, K. Jacobs and D.F. Walls, Phys. Rev. A 50, 5256-5263 (1994).
- A QND Measurement of Photon Number using Radiation Pressure**
K. Jacobs, P. Tombesi, M.J. Collett and D.F. Walls, Phys. Rev. A 49, 1961-1966, (1994).

Brief Reports

Concatenated beam splitters, optical feed-forward and the nonlinear sign gate

K. Jacobs and J. Dowling, Phys. Rev. A 74, 064304(BR) (2006)

A simple formula for pooling knowledge about a quantum system

K. Jacobs, Phys. Rev. A 72, 044101(BR) (2005)

Quantum error correction for continuously detected errors with any number of error channels per qubit

C. Ahn, H.M. Wiseman and K. Jacobs, Phys. Rev. A 70, 024302(BR) (2004)

Efficient Measurements, Purification, and Bounds on the Mutual Information

K. Jacobs, Phys. Rev. A 68, 054302(BR) (2003)

Non-Peer Reviewed Articles

Review Articles

Quantum Feedback Control: How can we control quantum systems without disturbing them?

S. Habib, K. Jacobs and Hideo Mabuchi, Los Alamos Science 27, 126 (2002)

The Emergence of Classical Dynamics in a Quantum World

T. Bhattacharya, S. Habib and K. Jacobs, Los Alamos Science 27, 110 (2002)

Book Reviews

P. Kok and B. Lovett: An Introduction to Optical Quantum Information Processing

K. Jacobs, Quantum Inf. Processing 10, 717 (2011)

Articles in Conference Proceedings

Rapid State-Purification in a Superconducting Charge Qubit

E. J. Griffith, C. D. Hill, J. F. Ralph, K. Jacobs and H. M. Wiseman,
Proceedings of Photon '06 (to appear 2006)

Applications of Feedback Control in Quantum Systems

K. Jacobs, Proceedings of the 6th Asian Control Conference, p. 35 (2006)

Nonlinear Quantum Dynamics

S. Habib, T. Bhattacharya, A.C. Doherty, B. Greenbaum, A. Hopkins,
K. Jacobs, H. Mabuchi, K. Schwab, K. Shizume, D. Steck, B. Sundaram,
in Proceedings of the NATO Advanced Workshop
"Nonlinear Dynamics and Fundamental Interactions," NATO Science Series II:
Mathematics, Physics and Chemistry, Vol. 213, F. Khanna et al. (Eds)
(Springer, New York, 2005), p. 43-56.

Chaos and Quantum Mechanics

S. Habib, T. Bhattacharya, B. Greenbaum, K. Jacobs, K. Shizume, B. Sundaram,
in "Nonlinear Dynamics in Astronomy and Physics: In memory of Henry Kandrup",
Annals of the New York Academy of Sciences Vol. 1045,
H. E. Kandrup et al. (Eds), p. 308 – 332 (Blackwell, Malden, 2005).

General Bound on the Accessible Information for Quantum Channels with Noisy Measurements

K. Jacobs, Proc. SPIE 5842, 256 (2005)

Limitation on the Accessible Information for Quantum Channels with Inefficient Measurements

K. Jacobs

Proceedings of The 1st Asia-Pacific Conference on Quantum Information Science
National Cheng Kung University, Tainan, 10-13 Dec 2004 (Published Nov 2005)

Optimal feedback control for rapid preparation of a qubit

K. Jacobs, Proc. of SPIE 5468, 355 (2004)

Cooling a Nano-Mechanical Resonator using Feedback: Towards Quantum Behavior

A. Hopkins, K. Jacobs, S. Habib and K. Schwab,

Proceedings of the SPIE International Symposium on Microelectronics, MEMS, and Nanotechnology, 2003 [Proc. SPIE 5276, 173 (2004)]

Quantum and Classical Dynamics of Atoms in a Magneto-optical Lattice

S. Ghose, P.M. Alsing, I.H. Deutsch, P.S. Jessen, D.L. Haycock, T. Bhattacharya, S. Habib and K. Jacobs,

Proceedings of the 7th Experimental Chaos Conference, 283-294 (2003)

Presentations

Keynote, Plenary, and Invited Presentations

Coherent Feedback Control: Recent Results and Further Questions (invited)

at the workshop Principles and Applications of Control in Quantum Systems (PRACQSYS) Monterey, CA, August 20-23, 2013

When coherent feedback beats measurement-based feedback (invited)

at the workshop Mathematical Aspects of Quantum Modeling, Estimation, and Control Padua, Italy, June 25-27, 2013

The energy cost of measurement (invited)

at the Japan Quantum Information Theory Meeting (QIT) Keio University, Yokohama, Japan, Nov 27 & 28, 2012

Multimode phonon physics (invited)

at the OSA Incubator meeting on "Cavity Optomechanics," Washington DC, October 1-2, 2012

Mechanical resonators: getting even cooler (invited)

at the Gordon Research Conference on Mechanical Systems in the Quantum Regime, Galveston, Texas, March 4-9, 2012

Real-time feedback control of a mesoscopic superposition (invited)

at the Joint Mathematics Meetings, Special Session: Mathematical Theory of Control of Quantum Systems, I Boston, Jan 7 (2012)

Open Systems, Noise, and Decoherence (invited)

at the 11th Canadian Summer School on Quantum Information, Jouvence, Quebec, Canada, June 6 - 15, 2011

Energy, Information, and Maxwell's Demon (invited)

Boston Energy in Science Teaching (BEST) Program Seminars, UMass Boston, Boston, Massachusetts, April 22nd, 2011

Engineering Giant Non-linearities in Quantum Nano-Systems (Invited)

at The Quantum Enabled Science and Technology (QuEST) workshop, La Fonda Hotel, Santa Fe, New Mexico, August 2011

Measurement Back-Action: Exploiting It and Avoiding It (Keynote)

at the Quantum Measurement and Control Workshop, Coogee, Sydney, Australia, Feb 11-13, 2010

What's Quantum About Quantum Feedback Control? (Invited)

at the IEEE-LEOS/Boston Quantum Entanglement Workshop, Boston, April 29th, 2009 (This workshop ran on the 5 Wednesday evenings in April)

Feedback Control and Quantum Jumps (Invited)

at the 37th Winter Colloquium on the Physics of Quantum Electronics (PQE-2007) Snowbird, Utah, 2 - 6 Jan 2007

A Continuous Quantum Non-Demolition Measurement of the Energy of a Nano-Mechanical Resonator (Invited)

at The 6th Quantum Enabled Science and Technology (QuEST) workshop, La Fonda Hotel, Santa Fe, New Mexico, 21-24 August 2006

Applications of Feedback Control in Quantum Systems (Plenary)

at The 6th Asian Control Conference

Inna Grand Bali Beach Hotel, Sanur, Bali, 18 - 21 Jul 2006

Using quantum feedback to increase information about quantum states (Invited)

at the ANU-UNSW Quantum Control Workshop

Australian National University, 20 September 2005

Rapid State-Reduction of Quantum Registers Using Feedback Control (Invited)

at the Fifth Quantum Enabled Science and Technology (QuEST) workshop,

La Fonda Hotel, Santa Fe, New Mexico, August 8-12 2005

Limitation on the Accessible Information for Quantum Channels with Inefficient Measurements (Invited)

at The 1st Asia-Pacific Conference on Quantum Information Science

National Cheng Kung University, Tainan, 10-13 Dec 2004

An Introduction to Quantum Error Correction and Fault Tolerance (Invited)

at the NTU Workshop on Quantum Information and Computation

National Taiwan University, Taipei, 14-15 Dec 2004

Cooling a Nano-Mechanical Resonator using Feedback: Towards Quantum Behavior (Invited)

at The SPIE International Symposium on Microelectronics, MEMS, and

Nanotechnology, Perth, Dec 10-12 2003, with A. Hopkins, S. Habib and K. Schwab

Information and Disturbance in Quantum Feedback Control (Invited)

at The Quantum Information Theory Workshop

of The International Conference on Experimental Implementation of

Quantum Computation, Gold Coast, Jan 21-25 2001

with A.C. Doherty, C.A. Fuchs and G. Jungman

Further Oral Conference Presentations

Quantum Control/Computing with Oscillators: Constructive Methods or Optimal Control?

at the American Physical Society March Meeting 2012,

Boston Convention Center, Boston, March 13-17, 2012, with X. Wang and F.W. Strauch

Creating Mesoscopic "Schrödinger Cats" in a Nano-mechanical Resonator

at the Joint Fall Meeting of the New England Sections of the APS/AAPT,

UMass Boston, Boston, Oct 10-11 2008, with L. Tian and J. Finn

Engineering Quantum Measurements in Nano-Electro-Mechanical Systems

at the Greater Boston Area Quantum Matter Meeting,

Jefferson Lab., Harvard, Boston, May 10 2008, with L. Tian and J. Finn

Rapid state-reduction of quantum systems using feedback control

at CLEO/QELS, Long Beach Convention Center, Long Beach, May 21-26 2006, with J. Combes

Rapid state-reduction of quantum systems using feedback control

at the American Physical Society March Meeting 2006,

Baltimore Convention Center, Baltimore, March 13-17, 2006, with J. Combes

Complementarity between work, entanglement and reference frame ability

at the Eighth Annual Southwest Quantum Information and Technology

Network Workshop, Albuquerque, Feb 16-19, 2006.

with J. Vaccaro, F. Anselmi and H. M. Wiseman

Complementarity between extractable mechanical work, accessible entanglement, and ability to act as a reference frame, under arbitrary superselection rules

at the Fifth ERATO Conference on Quantum Information Science,

National Museum of Emerging Science and Innovation, Tokyo, August 26-30 2005

with J. Vaccaro, F. Anselmi and H. M. Wiseman

General Bound on the Mutual Information for Quantum Channels with noisy measurements

at the SPIE International Symposium on Fluctuations and Noise,

Austin Marriott, Austin, Texas, May 23-26 2005

A bound on the mutual information for inefficient measurements

at the UQ workshop on Mathematical Aspects of Quantum Information Science, University of Queensland, Brisbane, January 27-28 2005

Optimal feedback control for rapid preparation of a single qubit

at the SPIE International Symposium on Fluctuations and Noise
Gran Hotel Costa Melonaras, The Canary Islands, May 26-28 2004

Feedback Control of Atomic Motion in an Optical Cavity

at the second annual CQCT workshop on quantum computing
Avoca Beach, Australia, February 17-20 2004.

with D. Steck, S. Habib, H. Mabuchi and T. Bhattacharya

Feedback Cooling of a Nanomechanical Resonator

at The CQCT-Griffith Workshop on Quantum Measurement Theory for
Solid State Devices. Griffith University, Australia, Nov 11 2003.

with A. Hopkins, S. Habib and K. Schwab

Measurement Strength and Classical Capacity

at The Perimeter Institute Quantum Information Mini-Workshop
The Perimeter Institute, Waterloo, Canada, March 25 2003.

Feedback Control of Atomic Motion in an Optical Cavity

at The Third Annual Southwest Quantum Information and Technology
Network Workshop, Caltech, Pasadena, March 3-5 2001.

with S. Habib and H. Mabuchi

An Information Trade-Off for Finite Strength Quantum Measurements

at The Second Annual Southwest Quantum Information and Technology
Network Workshop, Albuquerque, May 19-21, 2000.

with A.C. Doherty, C.A. Fuchs and G. Jungman

Professional Services

Reviewing Grant Proposals

2012 Reviewer for EPSRC (Engineering and Physical Sciences Research Council, UK)

2009 - present Reviewer for the NSF

2006 - 2008 Reviewer for the Austrian Science Fund (FWF)

Conference Organization

1. Member of the Organizing Committee for

The 2008 Joint fall meeting of the New England Sections of the APS and AAPT

October 10 & 11, 2008 – Boston, MA

2. Member of the Technical Program Committee for

The Second International Conference on Quantum, Nano, and Micro Technologies

February 10-15, 2008 – Sainte Luce, Martinique

Refereeing for Peer-Review Journals

Nature, Nature Physics, Physical Review Letters, Physical Review A, E, and X, New Journal of Physics, EPL, Journal of Mathematical Physics, IEEE Transactions on Automatic Control, Quantum Information and Computation, SIAM Journal on Control and Optimization, Systems & Control Letters, Journal of Optics B, Journal of Physics A & B, Physica A.