

# Mohan Sarovar

[Curriculum Vitae - August 2009]

## PERSONAL

### Address

Department of Chemistry  
214 Gilman Hall (Whaley Group)  
University of California, Berkeley  
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<http://www.cchem.berkeley.edu/kbwgrp/mohan/me.html>

### Citizenship

Australian

## POSITIONS HELD

**University of California, Berkeley**  
Berkeley, CA, USA

Post-doctoral Research Associate  
*September 2006 - Present*

*Focus:* Quantum control and measurement, quantum information, semiconducting and superconducting quantum computer implementations.

*Supervisor:* Prof. K. Birgitta Whaley

## EDUCATION

**University of Queensland**

Brisbane, Australia

Doctor of Philosophy, Physics  
*March 2003 - August 2006 (Degree awarded: May 2007)*

*Focus:* Quantum information theory and quantum control.

*Supervisors:* Prof. Gerard Milburn and Prof. Michael Nielsen

**Cornell University**

Ithaca, NY, USA

Master of Engineering  
*August 2001 - May 2002*

*Major:* Electrical Engineering. Focus on ad-hoc and mobile networking.

*Advisor:* Prof. Zygmunt Haas

*GPA:* 4.1 (4.0 scale)

**Cornell University**

Ithaca, NY, USA

Bachelor of Science, Cum Laude  
*August 1996 - August 2000*

*Double major:* Electrical Engineering (honors) and Computer Science.

*GPA:* 3.7 (4.0 scale)

## RESEARCH INTERESTS

- Quantum control, especially continuous feedback control of quantum systems.
- Quantum dynamics and transport in complex, interconnected, irregular systems such as organic molecular structures.
- High-fidelity measurement of quantum systems, especially within the context of quantum computing.
- Control and avoidance of decoherence in quantum systems.

## PUBLICATIONS Submitted journal articles

1. Chris Herdman, Kevin C. Young, Vito Scarola, **Mohan Sarovar**, K. Birgitta Whaley. *Stroboscopic generation of topological protection*. (Submitted to Phys. Rev. Lett.).  
arXiv:0907.3988 [quant-ph].
2. **Mohan Sarovar**, Akihito Ishizaki, Graham. R. Fleming, K. Birgitta Whaley. *Quantum entanglement in photosynthetic light harvesting complexes*. (Submitted to Nature Physics).  
arXiv:0905.3787 [quant-ph]

## Peer-reviewed journal articles

1. Milos Drezgic, Andrew Hines, **Mohan Sarovar**, Shankar S. Sastry. *Complete characterization of mixing time for the continuous quantum walk on the hypercube with Markovian decoherence model*. Quant. Inf. Comp. **9**, 856 (2009).  
arXiv:0811.4472 [quant-ph].
2. Kevin C. Young, **Mohan Sarovar**, Robert Kosut, K. Birgitta Whaley. *Optimal quantum multi-parameter estimation as applied to dipole- and exchange-coupled qubits*. Phys. Rev. A **79** 062301 (2009).  
arXiv:0812.4635 [quant-ph].
3. **Mohan Sarovar**, Kevin C. Young, Thomas Schenkel, K. Birgitta Whaley. *Quantum non-demolition measurements of single spins in semiconductors*. Phys. Rev. B **78** 245302 (2008).  
arXiv:0711.2343 [cond-mat].
4. **Mohan Sarovar**, K. Birgitta Whaley. *Adaptive homodyne phase discrimination and qubit measurement*. Phys. Rev. A **76** 052316 (2007).  
arXiv:0706.2506 [quant-ph].
5. **Mohan Sarovar**, G. J. Milburn. *Optimal estimation of one parameter quantum channels*. J. Phys. A: Math. Gen. **39** 8487 (2006).  
arXiv:quant-ph/0406070.
6. **Mohan Sarovar**, Hsi-Sheng Goan, T. P. Spiller, G. J. Milburn. *High fidelity measurement and quantum feedback control in circuit QED*. Phys. Rev. A **72** 062327 (2005).  
arXiv:quant-ph/0508232.
7. **Mohan Sarovar**, G. J. Milburn. *Continuous quantum error correction by cooling*. Phys. Rev. A **72** 012306 (2005).  
arXiv:quant-ph/0501038.
8. G. J. Milburn, **Mohan Sarovar**, C. Ahn. *Quantum control and quantum error correction*. Aust. J. of Electrical and Electronics Engineering **2**, 151 (2005).
9. **Mohan Sarovar**, Charlene Ahn, Kurt Jacobs, G. J. Milburn. *Practical scheme for error control using feedback*. Phys. Rev. A **69** 052304 (2004).  
arXiv:quant-ph/0402017.

## Conference proceedings

1. **Mohan Sarovar**, Kevin C. Young, Thomas Schenkel, K. Birgitta Whaley. *Using nanoscale transistors to measure single donor spins in semiconductors*. Quantum Communication, Measurement, and Computing (QCMC) 08. AIP Conference Proceedings (2008).
2. **Mohan Sarovar**, G. J. Milburn. *Continuous quantum error correction*. SPIE Fluctuations and Noise Proceedings (2005).
3. **Mohan Sarovar**, G. J. Milburn. *Continuous quantum error correction*. Quantum Communication, Measurement, and Computing (QCMC) 04. AIP Conference Proceedings (2004).  
arXiv:quant-ph/0501049.
4. G. J. Milburn, **Mohan Sarovar**, Charlene Ahn. *Quantum control and quantum error correction*. Proceedings of the 5th Asian Control Conference. IEEE Press. (2004).

## Manuscripts in preparation

1. **Mohan Sarovar**, Yuan-Chung Cheng, K. Birgitta Whaley. *Excitation transport in open quantum systems: the role of environmental correlations*. (To be completed September 2009).
2. Stephan Hoyer, **Mohan Sarovar**, K. Birgitta Whaley *Quantum random walks in energy landscapes*. (To be completed September 2009).

## MEDIA COVERAGE OF RESEARCH

- *Chlorophyll power*, Scientific American, September 2009. News article about work on quantum entanglement in photosynthetic light harvesting complexes: arXiv:0905.3787 [quant-ph].
- *First evidence of entanglement in photosynthesis*, The physics arXiv blog, MIT Technology Review, May 2009. News article about work on quantum entanglement in photosynthetic light harvesting complexes: arXiv:0905.3787 [quant-ph].
- *A toolkit for silicon-based quantum computing*, Berkeley Lab News, October 2008. Press release about work on silicon donor qubit measurement: arXiv:0711.2343 [cond-mat].

## TALKS AND POSTERS

- Invited talk. *Quantum entanglement in photosynthetic light harvesting*. Joint Quantum Institute and National Institute of Standards and Technology, Gaithersburg, MD, USA. July 2009.
- Contributed talk. *Quantum entanglement in photosynthetic light harvesting*. Workshop on Quantum Effects in Biological Systems, Lisbon, Portugal. July 2009.
- Invited talk. *Optimal quantum multi-parameter estimation*. NASA Ames Research Center, San Jose, CA, USA. June 2009.
- Invited talk. *Entanglement in photosynthetic light harvesting*. Indian Institute of Technology Madras, India. May 2009.
- Invited talk. *Entanglement in photosynthetic light harvesting*. Indian Institute of Science, India. May 2009.
- Contributed talk. *Excitation transport in open quantum systems: the role of environmental correlations*. APS March meeting, Pittsburgh, PA, USA. March 2009.
- Invited talk. *Quantum coherence in photosynthesis*. DARPA Workshop on Quantum Effects in Biology, Arlington, VA, USA. October 2008. (Talk delivered by collaborator: Yuan-Chung Cheng).
- Invited talk. *Quantum control and quantum information*. National Institute of Standards and Technology, Gaithersburg, MD, USA. April 2006.
- Contributed talk. *Continuous quantum error correction*. SPIE Fluctuations and Noise, Austin, Texas, USA. May 2005.
- Seminar at the Fields Institute, University of Toronto, Toronto, Canada: *Continuous quantum error correction*. July 2005.
- Seminar at Department of Applied Mathematics and Theoretical Physics, Cambridge University, Cambridge, UK: *Optimal estimation of one parameter semigroups*. August 2004.
- Invited talk. *Quantum error correction and closed-loop quantum control*. Quantum Communication, Measurement and Computing (QCMC) 04. University of Strathclyde, Glasgow, UK. July 2004.
- Posters at QCMC 2008, Calgary, Canada; Gordon Research Conference on Quantum Information, Ventura, USA 2004; Australian Institute of Physics Biennial Congress, Canberra, Australia 2005; Quantum Control Summer School, Pasadena, USA 2005; Sir Mark Oliphant Quantum Nanoscience Conference, Noosa, Australia 2006; Gordon Research Conference on Quantum Information, Barga, Italy 2007.

## HONORS

- Australian Postgraduate Award Scholarship 2003 - 2006
- Tau Beta Pi (U.S. national engineering honour society) inductee
- Eta Kappa Nu (U.S. national electrical engineering honour society) inductee
- Golden Key National Honour Society inductee
- Deans List for every semester of undergraduate study

**OTHER  
ACTIVITIES**

**Referee** for Physical Review Letters, Physical Review A/B, Journal of Physics A/B  
**Berkeley Quantum Information and Computation Seminar**  
Organize inter-departmental seminar series. *September 2006 - July 2008*  
**University of Queensland Physics Colloquium**  
Co-organized departmental colloquium series. *June 2003 - December 2005*

**TEACHING  
EXPERIENCE**

**Guest lecturer**, University of California, Berkeley. *September 2007*

- *Quantum Information Science* introductory course

**Tutor**, University of Queensland. *Mar 2003 - June 2006*

- Tutor for honours level Quantum Field Theory course
- Tutor for several introductory level physics courses

**Certified Group Facilitator**, Cornell University. *May 1999 - Dec 1999*

- Taught introductory college mathematics to large groups of underclassmen

**WORK  
EXPERIENCE**

**Beeline Technologies Pty. Ltd.**  
Brisbane, Australia

Electrical Engineer  
*September 2000 - June 2001*

**Cyracle Technologies**  
Reston, VA, USA

Software Development Leader  
*May 2000 - August 2000*

**PROFESSIONAL  
REFEREES**

**Prof. K. Birgitta Whaley**  
Professor  
Department of Chemistry  
219 Gilman Hall  
University of California, Berkeley  
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**Prof. Gerard Milburn**  
Professor  
School of Physical Sciences  
University of Queensland  
Brisbane, QLD 4072  
Australia  
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**Dr. Thomas Schenkel**  
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