

**Stephen P. Jordan**

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Sherman Fairchild Prize Fellow

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**Education**

- Ph.D. in physics, Massachusetts Institute of Technology, 2008. Advisor: Edward Farhi. Thesis: “Quantum Computing Beyond the Circuit Model.”
- BS in physics, Pennsylvania State University, 2003. Honors thesis: “Simulating the Inversion of Graphene Nanocones”

**Research Experience**

- September 2008-present: Sherman Fairchild prize postdoctoral fellow, Caltech. Advisor: John Preskill
- June/July 2008: Visiting researcher, RIKEN institute for Chemistry and Physics, Wako-shi, Japan.
- 2005-2008: PhD student, MIT, supported by QuaCGR fellowship for quantum computing.
- 2003-2004: MIT presidential fellow
- Summer, 2002 and 2003: REU (Research Experiences for Undergraduates) program. Advisor: Prof. Vincent Crespi, Penn State.
- Summer, 2000 and 2001: REU program. Advisor: Prof. Moses Chan, Penn State.

**Teaching Experience**

- Fall 2004: Teaching Assistant, MIT 8.13: Experimental Physics I, Prof. Isaac Chuang
- Spring 2005: Teaching Assistant, MIT 8.14: Experimental Physics II, Prof. Ulrich Becker.
- Spring 2005,2006,2007: Writing Assistant, MIT 8.06: Quantum Mechanics III, Prof. Krishna Rajagopal and Prof. Hong Liu
- Dec 2005: Guest lecture on quantum blackbox algorithms. Boston University: Algorithms and Data Structures, Prof. Richard Brower

**Awards**

Sherman Fairchild Prize Fellowship, Caltech Physics, 2008

QuaCGR Fellowship, 2005

MIT Presidential Fellowship, 2003

Braddock Scholarship, Penn State, 1999-2003

Robert C. Byrd Scholarship, 1999-2003

Schreyer Honors College, Penn State, 1999-2003

Phi Beta Kappa

Jean Bennett Award, Penn State Physics, 2003

## Invited Talks

- “Gadgets and Gizmos for Adiabatic Quantum Computation” Kavli Institute Program in Quantum Information Science, Santa Barbara. September 17, 2009.
- “QMA-complete problems for stoquastic Hamiltonians and Markov matrices” Workshop on Quantum Computation and Quantum Spin Systems. Erwin Schrödinger Institute, Vienna. August 10, 2009.
- “Permutational Quantum Computation”
  - Conference on Complexity Resources in Quantum Computation, Oxford, August 25, 2009.
  - Vladimir Buzek group meeting, Slovak Academy of Sciences, August 18, 2009.
  - Todd Brun group meeting, USC, July 14, 2009.
  - Alan Aspuru-Guzik group meeting, Harvard, May 12, 2009.
  - Quantum Information Seminar, MIT, May 11, 2009.
  - Quantum Lunch Seminar, UC Berkeley, April 17, 2009.
  - PIQUDOS Seminar, Perimeter Institute, April 3, 2009.
- “Locality and Fault Tolerance of Adiabatic Quantum Computation” Workshop on quantum computation and solid state systems, RIKEN, Wako-shi, Japan. June 9, 2008.
- “Perturbative Gadgets at Arbitrary Orders” Workshop on Universal Adiabatic Quantum Computation. D-Wave Systems, Burnaby, British Columbia. March 17-18, 2008.
- “Improved Fault Tolerance for Adiabatic Quantum Computers” Quantum Error Correction (QEC) 2007. University of Southern California, December 17-21 2007.
- “Estimating Jones Polynomials is a Complete Problem for One Clean Qubit” PIQUDOS Seminar, Perimeter Institute, October 31, 2007.
- “Error Correcting Codes for Adiabatic Quantum Computation” PIQUDOS Seminar, Perimeter Institute, July 18, 2007.
- “Quantum Gradient Estimation and Classical Optics” Workshop on Quantum Computational Methods for Differential Equations and Physics Problems, Los Alamos National Laboratory, May 25, 2007.
- “Error Correcting Codes for Adiabatic Quantum Computation” Institute for Quantum Information (IQI) Seminar, Caltech, January 9, 2007.
- “Fast Quantum Algorithm for Numerical Gradient Estimation,” International Seminar on Continuous Algorithms and Complexity, Schloss Dagstuhl, Germany, Sept 2004.

## Other Talks and Posters

- “Quantum Computation and Jones Polynomials” RIKEN Quantum Seminar, July 15, 2008.
- “Quantum Computing Beyond the Circuit Model” ARO Program Review. Minneapolis, MN. August 17, 2007. (talk and poster)

- “Error Correcting Codes for Adiabatic Quantum Computation” Quantum Information Processing (QIP) 2008. University of Queensland, Brisbane Australia. Feb 2, 2007. (talk)
- “Error Correcting Codes for Adiabatic Quantum Computation” ARO Program Review. San Diego, CA. July 26, 2006. (poster)
- “Quantum Blackbox Algorithms” MIT Center for Theoretical Physics Graduate Seminar. Cambridge, MA. Sep 23, 2005. (talk)
- “State Construction by Quantum Parallel Metropolis” ARO Program Review. Tampa, FL. Aug 22, 2005. (poster)
- “Simulating the Inversion of Carbon Nanocones” APS March Meeting. Austin, TX. March 7, 2003. (talk)

### Service

- Organizer of MIT quantum computing journal club, Fall 2005-Spring 2008.
- Referee for Physical Review Letters, Physical Review A, STOC, Quantum Information and Computation, SIAM Journal on Computing, and Theory of Computing.
- Author and maintainer of the “Quantum Algorithm Zoo.” An online repository of all known quantum algorithms. (<http://www.its.caltech.edu/~sjordan/zoo.html>)

### Papers and Preprints

- [15] P. Wocjan, S. Jordan, H. Ahmadi, and J. Brennan  
*Efficient quantum processing of ideals in finite rings*  
[arXiv:0908.0022]
- [14] Stephen P. Jordan  
*Permutational quantum computing*  
[arXiv:0906.2508]
- [13] Stephen P. Jordan and Peter J. Love  
*QMA-complete problems for stoquastic Hamiltonians and Markov matrices*  
Submitted to Phys. Rev. A [arXiv:0905.4755].
- [12] Stephen P. Jordan and Pawel Wocjan  
*Efficient quantum circuits for arbitrary sparse unitaries*  
Submitted to Phys. Rev. Lett. [arXiv:0904.2211].
- [11] Stephen P. Jordan  
*Fast quantum algorithms for approximating some irreducible representations of groups*  
Submitted to SIAM Journal on Computing. [arXiv:0811.0526.]
- [10] Stephen P. Jordan  
*Quantum Computation Beyond the Circuit Model*  
Ph.D. Thesis, MIT, 2008. [arXiv:0809.2307]

- [9] Stephen P. Jordan and Pawel Wocjan  
*Estimating Jones and HOMFLY polynomials with One Clean Qubit*  
Quantum Information and Computation Vol. 9, No. 3/4, pg. 264-289. (2009)  
[arXiv:0807.4688]
- [8] Stephen P. Jordan and Edward Farhi  
*Perturbative Gadgets at Arbitrary Orders*  
Phys. Rev. A 77, 062329 (2008) [arXiv:0802.1874]
- [7] I. Kassal, S. Jordan, P. Love, M. Mohseni, and A. Aspuru-Guzik  
*Quantum algorithms for the simulation of chemical dynamics*  
PNAS, Vol. 105, No. 48, pg. 18681-18686 (2008). [arXiv:0801.2986]
- [6] Peter W. Shor and Stephen P. Jordan  
*Estimating Jones Polynomials is a Complete Problem for One Clean Qubit.*  
Quantum Information and Computation Vol 8, No 8/9, pg. 681-714 (2008) [arXiv:0707.2831]
- [5] A. Childs, R. Cleve, S. Jordan, and D. Yonge-Mallo  
*Discrete Query Quantum Algorithm for NAND trees.*  
Theory of Computing Vol. 5 (2009). [quant-ph/0702160]
- [4] Stephen P. Jordan, Edward Farhi, and Peter W. Shor  
*Error correcting codes for adiabatic quantum computation.*  
Phys. Rev. A, 74, 052322 (2006) [quant-ph/0512170]
- [3] Stephen P. Jordan  
*Fast quantum algorithm for numerical gradient estimation.*  
Phys. Rev. Lett. **95**, 050501 (2005) [quant-ph/0405146]
- [2] Stephen P. Jordan and Vincent H. Crespi  
*Mechanical manipulation of graphene nanocones: Chiral inversion of a micron-scale three-dimensional object.*  
Phys. Rev. Lett. **93**, 255504 (2004)
- [1] R. Garcia, S. Jordan, J. Lazzaretti, and M. Chan  
*Quartz microbalance study of thick He-4 film near the superfluid transition.*  
J. Low Temp. Phys. **134**(1-2):527-533 Jan 2004

## References

Available upon request.