

# Pradeep Kiran Sarvepalli

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**Research Interests** Classical and quantum coding theory, quantum cryptography, quantum algorithms, quantum computation, circuit design.

**Education** Ph. D., Computer Science, 2008 Texas A&M University, College Station, USA  
Thesis : ["Quantum stabilizer codes and beyond"](#).

M. S., Electrical Engineering, 2003 Texas A&M University, College Station, USA  
Thesis : ["Non data aided timing recovery for linear and nonlinear modulations"](#)

B. Tech., Electrical Engineering, 1997 Indian Institute of Technology, Madras, India  
Thesis : "A translinear principle based BICMOS transconductor"

**Employment** **Assistant Professor, Indian Institute of Technology Madras, Chennai** Oct 2012 –  
**Postdoctoral Fellow, Georgia Institute of Technology, Atlanta** Dec 2011 – Sep 2012  
**Postdoctoral Fellow, University of British Columbia, Vancouver** Jan 2009 – Aug 2011  
**IC Design Engineer, Texas Instruments India, Bangalore** Jul 1997 – Jul 2001

**Teaching** **Courses taught at IIT Madras:** Error control coding, Quantum computation and quantum information, Modern coding theory, Applied linear algebra, Information Theory, Probability Foundations for EE  
**Teaching Assistant, ECE Department, Texas A&M University** Jan 2003 – May 2003

## Publications

Journal (18)

34. R. Raussendorf, P. Sarvepalli, T.-C. Wei, P. Haghnegahdar. [Symmetry constraints on temporal order in measurement-based quantum computation](#). Information and Computation, vol. 250. pg. 115–138, 2016. Special issue on quantum physics and logic.
33. P. Sarvepalli. [Relation between surface codes and hypermap-homology quantum codes](#). in Phys. Rev. A 89, 052316 (2014).
32. P. Sarvepalli and P. Wocjan. [Quantum algorithms for one-dimensional infrastructures](#). Quantum Information & Computation, vol. 14, no. 1–2, pg. 56–90 (2014).
31. P. Sarvepalli and K. R. Brown. [Topological subsystem codes from graphs and hypergraphs](#). Phys. Rev. A 86, 042336 (2012).
30. P. Sarvepalli [Nonthreshold quantum secret-sharing schemes in the graph-state formalism](#) Phys. Rev. A 86, 042303 (2012).
29. P. Sarvepalli and R. Raussendorf. [Efficient Decoding of Topological Color Codes](#). Phys. Rev. A 85, 022317 (2012).
28. P. Sarvepalli. [Entropic inequalities for a class of quantum secret sharing schemes](#). Phys. Rev. A. 83, 042303, 2011.
27. P. Sarvepalli. [Bounds on the information rate of quantum secret sharing schemes](#). Phys. Rev. A. 83, 042324, 2011.
26. P. Sarvepalli and R. Raussendorf. [Local equivalence, surface code states and matroids](#). *Phys. Rev. A* 82, 022304, 2010.
25. P. Sarvepalli and R. Raussendorf. [Matroids and quantum secret sharing schemes](#). *Phys. Rev. A* 81, 052333, 2010.

24. P. K. Sarvepalli and A. Klappenecker. [Degenerate quantum codes and the quantum Hamming bound](#). *Phys. Rev. A* 81, 032318, 2010.
23. P.K. Sarvepalli and A. Klappenecker. [Encoding subsystem codes](#) *International Journal on Advances in Security*, vol 2, no. 2 and 3, pages 142-155, 2009.
22. P. K. Sarvepalli and A. Klappenecker. [Sharing classical secrets with Calderbank-Shor-Steane codes](#). *Phys. Rev. A* 80, 022321, 2009.
21. P. K. Sarvepalli, A. Klappenecker, and M. Rötteler. [Asymmetric Quantum Codes: Constructions, Bounds, and Performance](#). *Proc. Roy. Soc. A*, May 2009 vol. 465 no. 2105 1645-1672
20. A. Klappenecker and P. K. Sarvepalli. [Clifford code constructions of operator quantum error correcting codes](#). *IEEE Trans. Inform. Theory*, 54(12):5760–5765, 2008.
19. A. Klappenecker and P. K. Sarvepalli. [On subsystem codes beating the quantum Hamming or Singleton bound](#). *Proc. Roy. Soc. A*, 463, 2887–2905, 2007.
18. S. A. Aly, A. Klappenecker, and P. K. Sarvepalli. [On quantum and classical BCH codes](#). *IEEE Trans. Inform. Theory*, 53(3):1183–1188, 2007.
17. A. Ketkar, A. Klappenecker, S. Kumar, and P. K. Sarvepalli. [Nonbinary stabilizer codes over finite fields](#). *IEEE Trans. Inform. Theory*, 52(11):4892–4914, 2006.

Conference (16)

16. A. Bhagoji and P. Sarvepalli. Equivalence of topological color codes (without translational symmetry) to surface codes. In *Proc. IEEE Intl. Symposium on Information Theory, 2015*, Hong Kong, 2015.
15. P. Sarvepalli. Quantum codes and symplectic matroids. In *Proc. IEEE Intl. Symposium on Information Theory, 2014*, Honolulu, USA, 2014.
14. P. Sarvepalli, and R. Raussendorf. Local equivalence of surface code states. 16 pages, In *Proceedings of The 5th Conference on the Theory of Quantum Computation, Communication and Cryptography, 2010*. Apr 13-15, University of Leeds, UK.
13. P. Sarvepalli. Topological color codes over higher alphabet. [\(Invited\)](#) IEEE Information theory workshop 2010, Dublin, Ireland.
12. P. K. Sarvepalli, M. Rötteler, and A. Klappenecker. Decoding Algorithm for a Generalized Shor Codes and A class of Subsystem Codes. *Proc. Intl. Symposium on Information Theory*, Toronto, Canada, 2009.
11. P. K. Sarvepalli and A. Klappenecker. Encoding subsystem codes with and without noisy gauge qubits. [\(Best Paper Award\)](#) In *Proc. ICQNM 2009, The Third International Conference on Quantum, Nano and Micro Technologies*, February 1-6, 2009 Cancun, Mexico.
10. P. K. Sarvepalli, M. Rötteler, and A. Klappenecker. Asymmetric quantum LDPC codes. *Proc. Intl. Symposium on Information Theory*, Toronto, Canada, 2008.
9. S. A. Aly, A. Klappenecker, and P. K. Sarvepalli. Duadic group algebra codes. In *Intl. Symposium on Information Theory*, Nice, France, 2007.
8. S. A. Aly, A. Klappenecker, and P. K. Sarvepalli. Quantum convolutional codes from generalized Reed-Solomon codes. In *Intl. Symposium on Information Theory*, Nice, France, 2007.
7. S. A. Aly, M. Grassl, A. Klappenecker, M. Roetteler, and P. K. Sarvepalli. Quantum convolutional BCH codes In *Proc. 10th Canadian Workshop on Information Theory*, Edmonton, Canada, 2007.
6. S. A. Aly, A. Klappenecker, and P. K. Sarvepalli. Subsystem codes. [\(Invited\)](#) In *Forty-Fourth Annual Allerton Conference on Communication, Control, and Computing*, Illinois, USA, 2006.
5. S. A. Aly, A. Klappenecker, and P. K. Sarvepalli. Primitive BCH codes over finite fields. In *Intl. Symposium on Information Theory*, Seattle, USA, 2006.
4. S. A. Aly, A. Klappenecker, and P. K. Sarvepalli. Remarkable degenerate quantum stabilizer codes derived from duadic codes. In *Intl. Symposium on Information Theory*, Seattle, USA, 2006.

3. P. K. Sarvepalli and A. Klappenecker. Nonbinary quantum codes from hermitian curves. In M. Fossorier et al., (eds), *Applied Algebra, Algebraic Algorithms and Error-Correcting Codes: 16th International Symposium, AAECC-16*, Las Vegas, NV, USA, February 20-24, 2006.
2. A. Klappenecker and P. K. Sarvepalli. Nonbinary quantum Reed-Muller codes. In *Proc. 2005 IEEE Intl. Symposium on Information Theory*, Adelaide, Australia, pages 1023-1027, 2005.
1. Pradeep Kiran and K. Radhakrishna Rao. A novel BIMOS translinear principle based transistor. *IEEE International Conference on VLSI*, Madras, India, 1998.

#### Book Chapters

1. P. K. Sarvepalli, S. A. Aly, and A. Klappenecker. Nonbinary stabilizer codes. In (eds) G. Chen, L. Kauffman and S. Lomonaco, Jr., *Mathematics of quantum computation and quantum technology*, Taylor and Francis, 2007.

#### Preprints

3. A. B. Alosious, and P. Sarvepalli. [Projecting 3D color codes onto 3D toric codes](#), arXiv:1606.00960, 2016.
2. A. Klappenecker and P. K. Sarvepalli. [Encoding subsystem codes](#). arXiv:0806.4954, 2008.
1. P. Sarvepalli and A. Klappenecker. [Asymptotics of the quantum Hamming bound for subsystem codes](#). arXiv:0710.4271, 2007.

#### Presentations

- Equivalence of 2D color codes to surface codes. [\(Invited\)](#) 2015 Joint Telematics Group/IEEE Information Theory Society Invited Workshop, July 24, 2015, Indian Institute of Science, Bangalore, India.
- Quantum codes and symplectic matroids. In *Proc. IEEE Intl. Symposium on Information Theory, 2014*, Honolulu, USA, 2014.
- Quantum codes and symplectic matroids. [\(Invited\)](#) The 3rd biennial Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), May 31-June 3, 2011, University of Victoria in Victoria, BC, Canada.
- Quantum codes, symplectic matroids and secret sharing schemes. Seminar on quantum topology and quantum computing, Ohio State University, Columbus, USA, May 25, 2011.
- Matroids in quantum information processing. Université of Sherbrooke, Canada, April 12, 2011.
- Topological color codes over prime power alphabet. Discrete Math Seminar, Simon Fraser University, Vancouver, Canada, Dec 7, 2010.
- Quantum secret sharing schemes: Constructions and bounds. Centre for Quantum Technologies, National University of Singapore, Singapore, Nov 11, 2010.
- Topological color codes over higher alphabet. [\(Invited\)](#) IEEE Information Theory Workshop, Dublin, Ireland, Aug 30-Sep 3, 2010.
- Local equivalence of surface code states. Theory of Quantum Computation, Communication and Cryptography, University of Leeds, UK, April 13-15 2010.
- Quantum secret sharing, Matroids and stabilizer codes. [\(Invited\)](#) Canadian Mathematical Society Summer Meeting, New Brunswick, 2010.
- Matroids in quantum computing and quantum cryptography. [\(Invited\)](#) Applications of Matroid Theory and Combinatorial Optimization to Coding Theory, Banff International Research Station, Banff, Aug 2-7, 2009.
- Quantum secret sharing with CSS codes. Quantum Information Seminar, Department of Physics and Astronomy, University of British Columbia, Vancouver, Apr 29, 2009
- Sharing classical secrets with CSS codes. *Center for Advanced Studies Seminars*, University of New Mexico, Albuquerque, Nov 6, 2008.

- Asymmetric quantum LDPC codes. In *IEEE Intl. Symposium on Information Theory*, Toronto, Canada, Jul 6–11, 2008.
- Two approaches to sparse graph quantum codes. *Quantum information and graph theory: Emerging connections*, Perimeter Institute for Theoretical Physics, Waterloo, Apr 28 – May 2, 2008.
- Remarkable degenerate quantum stabilizer codes derived from duadic codes. In *IEEE Intl. Symposium on Information Theory*, Seattle, USA, 2006.
- Nonbinary quantum codes from Hermitian curves. In *Applied Algebra, Algebraic Algorithms and Error-Correcting Codes: 16th Intl. Symposium, AAECC-16*, Las Vegas, NV, USA, February 20–24, 2006.
- Nonbinary quantum Reed-Muller codes. In *IEEE Intl. Symposium on Information Theory*, Adelaide, Australia, 2005.

## Patents

- F. A. Mujica, U. Dasgupta, S. K. Oswal, M. Ali, P. Sarvepalli, P. Easwaran, D. N. Basu. “[Digital timing recovery method for communication receivers](#),” United States Patent 6983032.
- P. Sarvepalli and A. Chakravorty. Monitoring Fuel Consumption and Predicting Residual Fuel in a cylinder, No. 1774/CHE/2013, (Filed).
- A. Chakravorty and P. Sarvepalli. Fuel leakage detection system, No. 1337/CHE/2014, (Filed).
- M. Shukla, B. George, A. Chakravorty, P. Sarvepalli and S. Kuiry. Gas leak detector, arrestor and methods thereof. TEMP/E-1/41047/2017-CHE (Filed).
- M. Shukla, B. George, A. Chakravorty, P. Sarvepalli and S. Kuiry. Timer and/or temperature based actuator assembly for automatic rotation and turn off of knob. TEMP/E- 1/25028/2017-CHE (Filed).

## Awards and Honors

- Best paper award (2009 ICQNM, *The Third International Conference on Quantum, Nano and Micro Technologies*).
- Placed 74th All India in the GATE conducted in 1997 with 98.74 percentile.
- Secured 264th Rank in IIT-JEE 1993 out of nearly 100 000 candidates all over India.
- Placed in the top 1% of the state of Andhra Pradesh in the National Standard Examination in Physics, 1992 conducted by the Indian Association of Physics Teachers.
- Recipient of the A.P. State Merit scholarship (given to three students per year overall the state) in the year 1987.
- Received certificate of merit in the National Science Talent Search Exam, 1992.

## Service

- Reviewer                    IEEE Trans. Information Theory, Physical Review Letters, Physical Review A., International Symposium on Information Theory. Journal of Mathematical Physics.
- Co-organizer                Publication Chair, 23rd National Conference on Communications, 2017
- 10th Canadian Summer School on Quantum Information, University of British Columbia, Vancouver, Canada, Jul 17–30, 2010.
- Research Workshop on Quantum Algorithms, Computational Models, and Foundations of Quantum Mechanics, University of British Columbia, Vancouver, Canada, Jul 23–25, 2010.