

# Theodore J. Yoder

## Address

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## Education

Massachusetts Institute of Technology, Cambridge, MA  
Ph.D. in Physics  
Research advisor: Isaac Chuang

Franklin and Marshall College, Lancaster, PA (summa cum laude)  
B.A.s in Physics and Mathematics, Minor in Computer Science  
Research advisor: Gregory Adkins  
GPA 4.0 in majors, 4.0 overall

## Current Research

### IBM Research Staff

- Fundamental limitations of quantum error-correction
- Fault-tolerant architectures for near-term experiments
- Fault-tolerant universal quantum computing

## Publications

1. T. Jochym-O'Connor, A. Kubica, T.J. Yoder, The disjointness of stabilizer codes and limitations on fault-tolerant logical gates, arXiv:1710.07256 (2017).
2. D. Koh, M. Niu, T.J. Yoder, Quantum simulation from the bottom up: the case of rebits, arXiv:1708.09355 (2017).
3. T.J. Yoder, Universal fault-tolerant computing with Bacon-Shor codes, arXiv:1705.01686 (2017).
4. R. Takagi, T.J. Yoder, I. L. Chuang, Error rates and resource overheads of encoded three-qubit gates, arXiv:1707.00012 (2017)
5. T.J. Yoder, I. Kim, The surface code with a twist, *Quantum*, **1**, 2 (2017).
6. S. Kimmel, C. Lin, G. H. Low, M. Ozols, T. J. Yoder, Hamiltonian simulation with optimal sample complexity, *NPJ Quantum Information*, **3**, 13 (2017).
7. A. M. Dalzell, T. J. Yoder, I. L. Chuang, Fixed-point adiabatic quantum search, *PRA* **95** 012311 (2017).
8. R. McConnell, G. H. Low, T. J. Yoder, C. D. Bruzewicz, I. L. Chuang, J. Chiaverini, J. M. Sage, Heisenberg scaling of imaging resolution by coherent enhancement, [arxiv.org/abs/1606.02188](https://arxiv.org/abs/1606.02188) (2016).
9. G. H. Low, T. J. Yoder, I. L. Chuang, The methodology of resonant equiangular composite quantum gates, *PRX* **6** 041067 (2016).
10. T. J. Yoder, R. Takagi, I. L. Chuang, Universal fault-tolerant gates on concatenated stabilizer codes, *PRX* **6** 031039 (2016).
11. S. Kimmel, G. H. Low, T. J. Yoder, Robust calibration of a universal single-qubit gate set via robust phase estimation, *PRA* **92** 062315 (2015).
12. G. H. Low, T. J. Yoder, I. L. Chuang, Quantum imaging by coherent enhancement, *PRL* **114** 100801 (2015).
13. T. J. Yoder, G. H. Low, I. L. Chuang, Fixed-point quantum search with an optimal number of queries, *PRL* **113** 210501 (2014).

14. G. H. Low, T. J. Yoder, I. L. Chuang, Quantum inference on Bayesian networks, *Phys. Rev. A* **89** 062315 (2014).
15. G. H. Low, T. J. Yoder, I. L. Chuang, Optimal arbitrarily accurate composite pulse sequences, *Phys. Rev. A* **89**, 022341 (2014).
16. T. J. Yoder and G. S. Adkins, Higher order corrections to the hydrogen spectrum from the Standard-Model Extension, *Phys. Rev. D* **86**, 116005 (2012).
17. M. R. Frey and T. J. Yoder, Dissonance as a resource for probing the qubit depolarizing channel, *J. Phys. A* **45**, 385301 (2012).
18. M. R. Frey and T. J. Yoder, Strictly discordant quantum probes of the qubit depolarizing channel, Conference for Quantum Information and Computation X, April 2012.
19. T. J. Yoder and M. R. Frey, Probing correlation in quantum arrays, Conference for Quantum Information and Computation X, April 2012.
20. T. J. Yoder and G. S. Adkins, Resolution of the ellipsoid paradox in thermodynamics, *Am. J. Phys.* **79**(8), 811 (2011).
21. F. M. Abel, G. S. Adkins, and T. J. Yoder, Polarization effects in the decay of orthopositronium to three photons, *Phys. Rev. A* **83**(6), 2502 (2011).

## Presentations

1. Approximate error-correction. New trends in quantum error-correction workshop, Sherbrooke University. Invited lectures. April 2018.
2. The disjointness of stabilizer codes. Coogee workshop 2018. Invited talk. February 2018.
3. The disjointness of stabilizer codes. QIP 2018. Contributed talk. January 2018.
4. Universal computing with Bacon-Shor codes. Freie Universitat Berlin. Invited talk. October 2017.
5. Universal computing with Bacon-Shor codes. Quantum error correction conference. Invited talk. September 2017.
6. Universal computing with Bacon-Shor codes. Perimeter institute. Invited talk. August 2017.
7. Universal computing with Bacon-Shor codes. MIT Lincoln Labs. Invited talk. May 2017.
8. Universal computing with Bacon-Shor codes. Caltech IQI seminar. Invited talk. May 2017.
9. The surface code with a twist. Georgia Tech Quantum CRNCH. Invited talk. February 2017.
10. The surface code with a twist. Southwest Quantum Information and Technology. Contributed talk. February 2017.
11. The surface code with a twist. HRL Laboratories. Invited talk. January 2017.
12. What is quantum computing? Franklin & Marshall College. Invited talk. November 2016.
13. Low-overhead logical gates. IARPA Logicq technical exchange meeting. Invited talk. August 2016.
14. Pieceable fault-tolerance. Aspen winter conference on quantum information. Contributed talk. March 2016.
15. A universal fault-tolerant gate set for the 5-qubit quantum code. American physical society March meeting. Contributed talk. March 2016.

16. Constructing universal gates piece-by-piece. iQuISE MIT seminar. Invited talk. February 2016.
17. Constructing universal gates piece-by-piece. IBM TJ Watson research center. Invited talk. February 2016.
18. Quantum search and surefire souffles. iQuISE MIT seminar. Invited talk. February 2015.
19. Quantum inference on Bayesian networks. American physical society March meeting. Contributed talk. March 2014.