



Travis L Scholten

Curriculum Vitae

Education

- 2012–2018 **Ph.D, Physics**, *University of New Mexico*, Albuquerque, New Mexico.
(expected)
- 2015 **M.S., Physics**, *University of New Mexico*, Albuquerque, New Mexico.
- 2008–2012 **B.S., Physics**, *California Institute of Technology*, Pasadena, California.
- 2004–2008 **High School Diploma**, *St Mary Catholic Schools*, Dell Rapids, South Dakota.

Publications

2018

- [1] *Behavior of the Maximum Likelihood in Quantum State Tomography*

Travis L Scholten and Robin Blume-Kohout

New Journal of Physics **20** 023050

In preparation

A Quantum Information Criterion for Statistical Model Selection

Travis L Scholten and Robin Blume-Kohout

Classification and Estimation of Noise in Quantum Hardware Using Machine Learning

Travis L Scholten, Kevin Young, and Robin Blume-Kohout

Compressed Sensing via Maximum Likelihood - the Impact of Geometry on Estimation

Travis L Scholten, Jonathan A Gross, Robin Blume-Kohout, and Carlton M Caves

Experience

Professional

- 2013–Present **Student Intern, Research & Development**, *Sandia National Laboratories*, Albuquerque, NM.
Engaged in self-directed and collaborative work with colleagues for my PhD research in quantum characterization, verification, and validation. I specialized in the use of model selection, hypothesis testing, and machine learning to address such problems.
Particular Accomplishments:
- Developed Python code bases for scientific computation
 - Learned to use HPC clusters
 - Gave numerous presentations on my research
- 2013 **Tutor**, *UNM Naval ROTC*, Albuquerque, NM.
- 2012–2013 **Teaching Assistant**, *University of New Mexico*, Albuquerque, NM.
- 2011 **Teaching Assistant**, *Caltech Physics Department*, Pasadena, CA.

2011 **Summer Undergraduate Research Fellow**, *Institute for Quantum Information and Matter, Caltech*, Pasadena, CA.

Worked in John Preskill's group, to develop research skills and techniques during a summer project to understand the computational efficiency of a particular adiabatic quantum computation.

Particular Accomplishments:

- Wrote MATLAB code for numerical simulations
- Presented my research at an annual speaking competition, where I advanced to the final round.

2009 **Lab Assistant**, *Ya-Hong Xie's group (UCLA, Materials Science)*, Los Angeles, CA.

Performed experimental research characterizing graphene samples using atomic force microscopy.

Miscellaneous

2017 **Organizer**, *Computing Workshop*, Center for Quantum Information and Control, UNM.

2016–2017 **Vice-Chair**, *Graduate and Professional Student Association Finance Committee*, UNM.

2015–2017 **Council Representative, Physics and Astronomy**, *Graduate and Professional Student Association*, UNM.

Courses Taught

2013 Fall UNM: Graduate Classical Mechanics - TA

2013 Spring UNM: Physics 102L, 160L - TA

2012 Fall UNM: Physics I, II - TA

2011 Spring Caltech: Physics 6 - TA

Awards

2017 Brian E Colón Exemplary Service Award, UNM GPSA

2016 Excellence in Ethics Award, UNM GPSA

2015 Student Research Grant, UNM GPSA

2014 Student Research Grant, UNM GPSA

2011 Robert L Blinkenberg SURF Fellow, Caltech

2011 Amasa Bishop Prize, Caltech

2010 Don Shepard Award, Caltech

2008 National Merit Scholarship

Presentations

From 2012 to present, I have given 17 talks and 3 posters.

2018 Mar **Talk**, *On the edge: Geometry, model selection, and quantum compressed sensing*, Institute for Quantum Information and Matter, California Institute of Technology.

2018 Mar **Talk**, *Machine Learning of Noise in Single-Qubit Hardware*, APS March Meeting, Los Angeles, California.

2018 Feb **Poster**, *High-Accuracy Classification of Single-Qubit Noise via Machine Learning*, Southwest Quantum Information and Technology Workshop, Santa Fe, New Mexico.

2017 Nov **Talk**, *Learning Noise in Quantum Information Processors*, Quantum Techniques in Machine Learning Workshop, Verona, Italy.

2017 Oct **Talk**, *A Few Thoughts on Characterizing Quantum Hardware*, Center for Quantum Information and Control, University of New Mexico.

2017 Mar **Talk**, *Behavior of the Maximum Likelihood in Quantum State Tomography*, APS March Meeting, New Orleans, Louisiana.

2017 Feb **Poster**, *An Effective State-Space Dimension for A Quantum System*, Southwestern Quantum Information and Technology Workshop, Baton Rouge, Louisiana.

2016 Dec **Talk**, *An Effective State-Space Dimension for A Quantum System*, Center for Quantum Information and Control, University of New Mexico.

- 2016 Nov **Talk**, *An Effective State-Space Dimension for A Quantum System*, ARC Centre of Excellence for Engineered Quantum Systems, University of Sydney, Australia.
- 2016 Jun **Talk**, *Tomographing Quantum State Tomography*, Last Frontiers in Quantum Information Science Workshop, Juneau, Alaska.
- 2016 Mar **Talk**, *Towards a Model Selection Rule for Quantum State Tomography*, APS March Meeting, Baltimore, Maryland.
- 2016 Feb **Talk**, *Towards a Model Selection Rule for Quantum State Tomography*, Southwestern Quantum Information and Technology Workshop, Albuquerque, New Mexico.
- 2015 Dec **Talk**, *On the Edge - State Tomography, Boundaries, and Model Selection*, Center for Quantum Information and Control, University of New Mexico.
- 2015 Oct **Talk**, *Inaccuracy in Quantum State Tomography - What is To Be Done?*, APS Four Corners Section Meeting, Tempe, Arizona.
- 2015 Apr **Talk**, *Look out Below! Computing on the Small Scale*, Shared Knowledge Conference, University of New Mexico.
- 2015 Mar **Talk**, *Applying Model Selection to Quantum State Tomography - Choosing Hilbert Space Dimension*, APS March Meeting, San Antonio, Texas.
- 2015 Mar **Talk**, *Physics for Computation - Using Novel Devices to Solve Hard Problems*, US-China Young Physicists' Forum, San Antonio, Texas.
- 2015 Feb **Poster**, *Lost in (Hilbert) Space - Model Selection for Quantum Tomography*, Southwestern Quantum Information and Technology Workshop, Berkeley, California.
- 2014 Oct **Talk**, *Statistical Inference in Quantum Tomography - Uses of Hypothesis Testing and Information Criteria*, Center for Quantum Information and Control, University of New Mexico.
- 2012 Jan **Talk**, *Spectral Gap Scaling of One-Dimensional Quantum Spin Chains*, Perpall speaking competition, California Institute of Technology, Pasadena, California.

Computer skills

- Expert PYTHON, scipy computing stack, matplotlib, pandas
- Intermediate Jupyter notebooks, git, Linux, seaborn data visualization
- Basic HTML, jekyll, Bash, Sphinx

Volunteer Work

- 2015 Software Carpentry Workshop
- 2009 Caltech Y Tutoring Program