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Education

University of California, Berkeley
Ph.D. 2002, M.S. 1998

Dissertation: SQUID-Detected NMR and MRI in Microtesla Magnetic Fields

Harvard University
A.B. *magna cum laude*, Physics 1993

Positions

2014-present	Professor, University of Wisconsin-Madison
2010-2014	Associate Professor, University of Wisconsin-Madison
2006-2010	Assistant Professor, University of Wisconsin-Madison
2004-2006	Postdoctoral Fellow, University of California, Santa Barbara
2003-2004	Postdoctoral Fellow, University of Colorado and National Institute of Standards and Technology, Boulder
1997-2002	Graduate Research Assistant, University of California, Berkeley and Lawrence Berkeley National Laboratory
1996-1997	Graduate Teaching Assistant, University of California, Berkeley

Honors and Awards

2015	Google Faculty Research Award
2009	Cottrell Scholar Award
2003-2004	National Research Council Fellowship, NIST, Boulder
1996	Graduate Student Teaching Award, UC Berkeley
1993	Phi Beta Kappa, Harvard University

Scientific Society Affiliations

American Physical Society

Publications

1. R. McDermott, M. G. Vavilov, B. L. T. Plourde, F. K. Wilhelm, P. J. Liebermann, O. A. Mukhanov, and T. A. Ohki, Quantum–Classical Interface Based on Single Flux Quantum Digital Logic, arXiv:1710.04645 (invited submission to special focus issue of *Quantum Sci. Technol.*) (2017).

2. T. Thorbeck, S. Zhu, E. Leonard Jr., R. Barends, J. Kelly, J. M. Martinis, and R. McDermott, Reverse Isolation and Backaction of the SLUG Microwave Amplifier, *Phys. Rev. Applied* **8**, 054007 (2017).

3. B. T. Gard, K. Jacobs, R. McDermott, and M. Saffman, Microwave-to-optical Frequency Conversion Using a Cesium Atom Coupled to a Superconducting Resonator, *Phys. Rev. A* **96**, 013833 (2017).

4. U. Patel, I. V. Pechenezhskiy, B. L. T. Plourde, M. G. Vavilov, and R. McDermott, Phonon-Mediated Quasiparticle Poisoning of Superconducting Microwave Resonators, arXiv:1610.09351 (submitted to *Phys. Rev. B*) (2016).

5. M. Schöndorf, L. C. G. Govia, M. G. Vavilov, R. McDermott, and F. K. Wilhelm, Optimizing Single Microwave-photon Detection: Input-Output Theory, arXiv:1609.08887 (submitted to *Quantum Sci. Technol.*) (2016).

6. P. Kumar, S. Sendelbach, M. A. Beck, J. W. Freeland, Z. Wang, H. Wang, C. C. Yu, R. Q. Wu, D. P. Pappas, and R. McDermott, Origin and Reduction of $1/f$ Magnetic Flux Noise in Superconducting Devices, *Phys. Rev. Applied* **6**, 041001 (selected as Editors' Suggestion) (2016).

7. M. A. Beck, J. A. Isaacs, D. Booth, J. D. Pritchard, M. Saffman, and R. McDermott, Optimized Coplanar Waveguide Resonators for a Superconductor-Atom Interface, *Appl. Phys. Lett.* **109**, 092602 (2016).

8. L. C. G. Govia, E. J. Pritchett, B. L. T. Plourde, M. G. Vavilov, R. McDermott, and F. K. Wilhelm, Scalable Two- and Four-qubit Parity Measurement with a Threshold Photon Counter, *Phys. Rev. A* **92**, 022335 (2015).

9. L. C. G. Govia, E. J. Pritchett, C. Xu, B. L. T. Plourde, M. G. Vavilov, F. K. Wilhelm, and R. McDermott, High-fidelity Qubit Measurement with a Microwave Photon Counter, *Phys. Rev. A* **90**, 062307 (2014).

10. Y. Liu, S. J. Srinivasan, D. Hover, S. Zhu, R. McDermott and A. A. Houck, High Fidelity Readout of a Transmon Qubit Using a Superconducting Low-inductance Undulatory Galvanometer Microwave Amplifier, *New J. Phys.* **16**, 113008 (2014).

11. R. McDermott and M. G. Vavilov, Accurate Qubit Control with Single Flux Quantum Pulses, *Phys. Rev. Applied* **2**, 014007 (2014).

12. D. Hover, S. Zhu, T. Thorbeck, G. J. Ribeill, D. Sank, J. Kelly, R. Barends, J. M. Martinis, and R. McDermott, High Fidelity Qubit Readout with the Superconducting Low-Inductance Undulatory Galvanometer Microwave Amplifier, *Appl. Phys. Lett.* **104**, 152601 (2014).

13. J. D. Pritchard, J. A. Isaacs, M. A. Beck, R. McDermott, and M. Saffman, Hybrid Atom–Photon Quantum Gate in a Superconducting Microwave Resonator, *Phys. Rev. A* **89**, 010301(R) (2014).

14. K.-H. Cho, U. Patel, J. Podkaminer, Y. Gao, C. M. Folkman, C. W. Bark, S. Lee, Y. Zhang, X. Q. Pan, R. McDermott, and C. B. Eom, Epitaxial Al_2O_3 Capacitors for Low Microwave Loss Superconducting Quantum Circuits, *APL Mater.* **1**, 042115 (2013).

15. U. Patel, Y. Gao, D. Hover, G. J. Ribeill, S. Sendelbach, and R. McDermott, Coherent Josephson Phase Qubit with a Single Crystal Silicon Capacitor, *Appl. Phys. Lett.* **102**, 012602 (2013).

16. A. Poudel, R. McDermott, and M. G. Vavilov, Quantum Efficiency of a Microwave Photon Detector based on a Current-biased Josephson Junction, *Phys. Rev. B* **86**, 174506 (2012).

17. D. Hover, Y.-F. Chen, G. J. Ribeill, S. Zhu, S. Sendelbach, and R. McDermott, Superconducting Low-Inductance Undulatory Galvanometer Microwave Amplifier, *Appl. Phys. Lett.* **100**, 063503 (2012).

18. G. J. Ribeill, D. Hover, Y.-F. Chen, S. Zhu, and R. McDermott, Superconducting Low-Inductance Undulatory Galvanometer Microwave Amplifier: Theory, *J. Appl. Phys.* **110**, 103901 (2011).

19. Y.-F. Chen, D. Hover, S. Sendelbach, L. Maurer, S. T. Merkel, E. J. Pritchett, F. K. Wilhelm, and R. McDermott, Microwave Photon Counter Based on Josephson Junctions, *Phys. Rev. Lett.* **107**, 217401 (2011).

20. M. P. DeFeo, P. Bhupathi, K. Yu, T. W. Heitmann, C. Song, R. McDermott, and B. L. T. Plourde, Microstrip Superconducting Quantum Interference Device Amplifiers with Submicron Josephson Junctions: Enhanced Gain at Gigahertz Frequencies, *Appl. Phys. Lett.* **97**, 092507 (2010).

21. S. Sendelbach, D. Hover, M. Mück, and R. McDermott, Complex Inductance, Excess Noise, and Surface Magnetism in dc SQUIDs, *Phys. Rev. Lett.* **103**, 117001 (2009).

22. M. Mück, D. Hover, S. Sendelbach, and R. McDermott, Microstrip Superconducting Quantum Interference Device Radio-frequency Amplifier: Effects of Negative Feedback on Input Impedance, *Appl. Phys. Lett.* **94**, 132509 (2009).

23. C. Song, T. W. Heitmann, M. P. DeFeo, K. Yu, R. McDermott, M. Neeley, J. M. Martinis, and B. L. T. Plourde, Microwave Response of Vortices in Superconducting Thin Films of Re and Al, *Phys. Rev. B* **79**, 174512 (2009).

24. R. McDermott, Materials Origins of Decoherence in Superconducting Qubits, *IEEE Trans. Appl. Supercond.* **19**, 2 (2009).

25. S. Sendelbach, D. Hover, A. Kittel, M. Mück, J. M. Martinis, and R. McDermott, Magnetism in SQUIDs at Millikelvin Temperatures, *Phys. Rev. Lett.* **100**, 227006 (2008). Supplementary notes: arXiv:0802.1511.

26. R. C. Bialczak, R. McDermott, M. Ansmann, M. Hofheinz, N. Katz, E. Lucero, M. Neeley, A. D. O'Connell, H. Wang, A. N. Cleland, and J. M. Martinis, $1/f$ Flux Noise in Josephson Phase Qubits, *Phys. Rev. Lett.* **99**, 187006 (2007).

27. W. Myers, D. Slichter, M. Hatridge, S. Busch, M. Mößle, R. McDermott, A. H. Trabesinger, and J. Clarke, Calculated Signal-to-noise Ratio of MRI Detected with SQUIDs and Faraday Detectors in Fields from 10 μT to 1.5 T, *J. Magn. Reson.* **186**, 182 (2007).

28. M. Steffen, M. Ansmann, R. C. Bialczak, N. Katz, E. Lucero, R. McDermott, M. Neeley, E. M. Weig, A. N. Cleland, and J. M. Martinis, Measurement of the Entanglement of Two Superconducting Qubits via State Tomography, *Science* **313**, 1423 (2006).

29. N. Katz, M. Ansmann, R. C. Bialczak, E. Lucero, R. McDermott, M. Neeley, M. Steffen, E. M. Weig, A. N. Cleland, J. M. Martinis, and A. N. Korotkov, Coherent State Evolution in a Superconducting Qubit from Partial-collapse Measurement, *Science* **312**, 1498 (2006).

30. M. Steffen, M. Ansmann, R. McDermott, N. Katz, R. C. Bialczak, E. Lucero, M. Neeley, E. M. Weig, A. N. Cleland, and J. M. Martinis, State Tomography of Capacitively Shunted Phase Qubits with High Fidelity, *Phys. Rev. Lett.* **97**, 050502 (2006).

31. S. Oh, D. A. Hite, K. Cicak, K. D. Osborn, R. W. Simmonds, R. McDermott, K. B. Cooper, M. Steffen, J. M. Martinis, and D. P. Pappas, Epitaxial Growth of Rhenium with Sputtering, *Thin Solid Films* **496**, 389 (2006).

32. J. M. Martinis, K. B. Cooper, R. McDermott, M. Steffen, M. Ansmann, K. D. Osborn, K. Cicak, S. Oh, D. P. Pappas, R. W. Simmonds, and C. C. Yu, Decoherence in Josephson Qubits from Dielectric Loss, *Phys. Rev. Lett.* **95**, 210503 (2005).

33. R. McDermott, R. W. Simmonds, M. Steffen, K. B. Cooper, K. Cicak, K. D. Osborn, S. Oh, D. P. Pappas, and J. M. Martinis, Simultaneous State Measurement of Coupled Josephson Phase Qubits, *Science* **307**, 1299 (2005).

34. S. Oh, K. Cicak, R. McDermott, K. B. Cooper, K. D. Osborn, R. W. Simmonds, M. Steffen, J. M. Martinis, and D. P. Pappas, Low-Leakage Superconducting Tunnel Junctions with a Single-Crystal Al_2O_3 Barrier, *Supercond. Sci. Technol.* **18**, 1396 (2005).

35. K. B. Cooper, M. Steffen, R. McDermott, R. W. Simmonds, S. Oh, D. A. Hite, D. P. Pappas, and J. M. Martinis, Observation of Quantum Oscillations between a Josephson

Phase Qubit and a Microscopic Resonator Using Fast Readout, *Phys. Rev. Lett.* **93**, 180401 (2004).

36. K. M. Lang, D. A. Hite, R. W. Simmonds, R. McDermott, D. P. Pappas, and J. M. Martinis, Conducting Atomic Force Microscopy for Nanoscale Tunnel Barrier Characterization, *Rev. Sci. Instrum.* **75**, 2726 (2004).

37. R. McDermott, S-K. Lee, B. ten Haken, A. H. Trabesinger, A. Pines, and J. Clarke, Microtesla MRI with a Superconducting QUantum Interference Device, *Proc. Natl. Acad. Sci.* **101**, 7857 (2004).

38. R. McDermott, N. Kelso, S-K. Lee, M. Mößle, M. Mück, W. Myers, B. ten Haken, H. C. Seton, A. H. Trabesinger, A. Pines, and J. Clarke, SQUID-Detected Magnetic Resonance Imaging in Microtesla Magnetic Fields, *J. Low Temp. Phys.* **135**, 793 (2004).

39. A. H. Trabesinger, R. McDermott, S-K. Lee, M. Mück, J. Clarke, and A. Pines, SQUID-detected Liquid State NMR in Microtesla Fields, *J. Phys. Chem. A* **108**, 957 (2004).

40. R. McDermott, A. H. Trabesinger, M. Mück, E. L. Hahn, A. Pines, and J. Clarke, Liquid-State NMR and Scalar Couplings in Microtesla Magnetic Fields, *Science* **295**, 2247 (2002).

41. A. Wong-Foy, S. Saxena, A. J. Moule, H. M. L. Bitter, J. A. Seeley, R. McDermott, J. Clarke, and A. Pines, Laser-polarized ^{129}Xe NMR and MRI at Ultralow Magnetic Fields, *J. Magn. Reson.* **157**, 235 (2002).

42. S. Saxena, A. Wong-Foy, A. J. Moule, J. A. Seeley, R. McDermott, J. Clarke and A. Pines, Resolution of ^{129}Xe Chemical Shifts at Ultralow Magnetic Field, *J. Am. Chem. Soc.* **123**, 8133 (2001).

43. Y. R. Chemla, H. L. Grossman, Y. Poon, R. McDermott, R. Stevens, M. D. Alper, and J. Clarke, Ultrasensitive Magnetic Biosensor for Homogeneous Immunoassay, *Proc. Natl. Acad. Sci.* **97**, 14268 (2000).

44. T. J. Shaw, J. W. Chan, S-H. Kang, R. McDermott, J. W. Morris, and J. Clarke, Scanning SQUID Microscope Differentiation of Ferromagnetic Steel Phases, *Acta Materialia* **48**, 2655 (2000).

45. K. Schlenga, R. McDermott, J. Clarke, R. E. de Souza, A. Wong-Foy and A. Pines, Low-Field Magnetic Resonance Imaging with a High-T_c dc Superconducting Quantum Interference Device, *Appl. Phys. Lett.* **75**, 3695 (1999).

46. R. E. de Souza, K. Schlenga, A. Wong-Foy, R. McDermott, A. Pines and J. Clarke, NMR and MRI Obtained with High Transition Temperature dc SQUIDs, *J. Brazilian Chem. Soc.* **10**, 132 (1999).

47. T. J. Shaw, K. Schlenga, R. McDermott, J. Clarke, J. W. Chan, S-H. Kang, and J. W. Morris, High-T_c SQUID Microscope Study of the Effects of Microstructure and Deformation on the Remanent Magnetization of Steel, *IEEE Trans. Appl. Supercon.* **9**, 4107 (1999).

48. H. M. Cho, R. McDermott, B. Oh, K. A. Kouznetsov, A. Kittel, J. H. Miller, and J. Clarke, Low-frequency Noise in Field-cooled, Directly Coupled Magnetometers, *IEEE Trans. Appl. Supercon.* **9**, 3294 (1999).

49. A. Kittel, K. A. Kouznetsov, R. McDermott, B. Oh, J. Clarke, C. Soble and V. Matijasevic, High-T_c Superconducting Second-order Gradiometer, *Appl. Phys. Lett.* **73**, 2197 (1998).

U.S. Patents

1. System and Method for Characterizing Ions Using a Superconducting Delay Line Detector: application allowed, patent forthcoming (2017).
   Inventors: R. McDermott and J. Suttle

2. Systems and Methods for Controlling Magnetically Active Defects in Superconducting Circuits: application allowed, patent forthcoming (2017).
   Inventors: R. McDermott and P. Kumar

3. System and Method for Controlling Superconducting Quantum Circuits Using Single Flux Quantum Logic Circuits: application allowed, patent forthcoming (2017).
   Inventors: R. McDermott and M. G. Vavilov

4. United States Patent 9,692,423: System and Method for Circuit Quantum Electrodynamics Measurement (2017).
   Inventors: R. McDermott, B. L. T. Plourde, M. G. Vavilov, F. K. Wilhelm, L. C. G. Govia, and E. J. Pritchett

5. United States Patent 8,861,619: System and Method for High-frequency Amplifier (2014).
   Inventors: R. McDermott, D. Hover, G. J. A. Ribeill, and Y.-F. Chen

6. United States Patent 7,187,169: NMR and MRI Apparatus and Method (2007).
   Inventors: J. Clarke, N. Kelso, S-K. Lee, M. Mößle, W. Myers, R. McDermott, B. ten Haken, A. Pines, and A. H. Trabesinger

7. United States Patent 6,885,192: SQUID Detected NMR and MRI at Ultralow Fields (2005).
   Inventors: J. Clarke, R. McDermott, A. Pines, and A. H. Trabesinger