Hugh O. H. Churchill

Curriculum Vitae

Physics 242B
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University of Arkansas
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Education

2012 Ph.D. in Physics, Harvard University
Dissertation title: "Quantum dots in gated nanowires and nanotubes"

2008 A.M. in Physics, Harvard University

2006 B.A. in Physics with highest honors and Mathematics, Oberlin College
B.M. in Tuba Performance, Oberlin Conservatory of Music

Employment

Aug 2015–present Assistant Professor of Physics, University of Arkansas
Research interests: quantum materials and devices, quantum transport, optoelectronics

Sept 2012–Aug 2015 Pappalardo Fellow, Massachusetts Institute of Technology Department of Physics
Quantum transport and optoelectronics in dichalcogenides (advisor P. Jarillo-Herrero)

April 2012–Sept 2012 Postdoctoral Fellow, Harvard University Department of Physics
Tunneling spectroscopy of superconducting InSb nanowire devices (advisor C. M. Marcus)

May 2006–April 2012 Research Assistant, Harvard University Department of Physics
Quantum dots in gated nanowires and nanotubes (advisor C. M. Marcus)

Honors

2016 Air Force Office of Scientific Research Young Investigator
2016 Connor Faculty Fellowship, University of Arkansas
2012 Pappalardo Postdoctoral Fellowship, MIT
2011 White Prize for Excellence in Teaching, Harvard
2010 IBM Ph.D. Fellow
2006 American Physical Society Apker Award for Undergraduate Research
2006 NSF Graduate Research Fellow
2006 James Mills Peirce Fellow, Harvard

2005 Barry M. Goldwater Scholarship

2005 Phi Beta Kappa, Sigma Xi, Pi Kappa Lambda

Research Articles

Total citations: > 1800 (Google Scholar)
h-index: 16

15. M. Mehboudi, A. M. Dorio, W. Zhu, A. van der Zande, **H. O. H. Churchill**, A. A. Pacheco-Sanjuan, E. O. Harriss, P. Kumar, and S. Barraza-Lopez, "Two-dimensional disorder in black phosphorus and monochalcogenide monolayers," *Nano Letters* **16,** 1704 (2016).

14. J. I.-J. Wang, Y. Yang, Y.-A. Chen, K. Watanabe, T. Taniguchi, **H. O. H. Churchill**, and P. Jarillo-Herrero, "Electronic Transport of Encapsulated Graphene and WSe_2 Devices Fabricated by Pick-up of Pre-patterned hBN," *Nano Letters* **15** 1898 (2015).

13. Britton W. H. Baugher*, **Hugh O. H. Churchill***, Yafang Yang, and Pablo Jarillo-Herrero, "Optoelectronic devices based on electrically tunable p-n diodes in a monolayer dichalcogenide," *Nature Nanotechnology* **9,** 262 (2014).
*equal contribution
→ accompanying *Nature Nanotechnology* News and Views:
R. Bratschitsch, "Optoelectronic devices: Monolayer diodes light up," *Nature Nanotechnology* **9,** 247 (2014).

12. R. A. Lai, **H. O. H. Churchill**, and C. M. Marcus, "g-Tensor control in bent carbon nanotube quantum dots," *Physical Review B* **89,** 121303, Rapid Communication (2014).

11. Britton W. H. Baugher, **Hugh O. H. Churchill**, Yafang Yang, and Pablo Jarillo-Herrero, "Intrinsic Transport Properties of High Quality Monolayer and Bilayer MoS_2," *Nano Letters* **13,** 4212 (2013).

10. **H. O. H. Churchill**, V. Fatemi, K. Grove-Rasmussen, M. T. Deng, P. Caroffe, H. Q. Xu, and C. M. Marcus, "Superconductor-nanowire devices from tunneling to the multichannel regime: Zero-bias oscillations and magnetoconductance crossover," *Physical Review B* **87,** 241401, Rapid Communication (2013).
→ Editors' suggestion and PRB Kaleidoscope, June 2013.

9. G. Yamahata, T. Kodera, **H. O. H. Churchill**, K. Uchida, C. M. Marcus, and S. Oda, "Magnetic field dependence of Pauli spin blockade: a window into the sources of spin relaxation in silicon quantum dots," *Physical Review B* **86,** 115322 (2012).

8. S. Weiss, E. I. Rashba, F. Kuemmeth, **H. O. H. Churchill**, and K. Flensberg, "Spin-orbit effects in carbon nanotube double quantum dots," *Physical Review B* **82,** 165427 (2010).

7. **H. O. H. Churchill**, F. Kuemmeth, J. W. Harlow, A. J. Bestwick, E. I. Rashba, K. Flensberg, C. H. Stwertka, T. Taychatanapat, S. K. Watson, C. M. Marcus, "Relaxation and dephasing in a two-electron ^{13}C nanotube double quantum dot," *Physical Review Letters* **102,** 166802 (2009).

6. **H. O. H. Churchill**, A. J. Bestwick, J. W. Harlow, F. Kuemmeth, D. Marcos, C. H. Stwertka, S. K. Watson, C. M. Marcus, "Electron-nuclear interaction in ^{13}C nanotube double quantum dots," *Nature Physics* **5,** 321 (2009).
   → accompanying *Nature Physics* News and Views:
   B. Trauzettel and D. Loss, "Carbon surprises again," *Nature Physics* **5,** 317 (2009).

5. Yongjie Hu*, **Hugh O. H. Churchill***, David J. Reilly, Jie Xiang, Charles M. Lieber, and Charles M. Marcus, "A Ge/Si heterostructure nanowire-based double quantum dot with integrated charge sensor," *Nature Nanotechnology* **2**, 622 (2007).
   *equal contribution
   → accompanying *Nature Nanotechnology* News and Views:
   M. A. Eriksson and M. Friesen, "Nanowires charge towards integration," *Nature Nanotechnology* **2,** 595 (2007).

4. S. A. FitzGerald, **H. O. H. Churchill**, P. Korngut, and C. B. Simmons, "Cryogenic apparatus for diffuse reflectance infrared spectroscopy with high-pressure capabilities," *Review of Scientific Instruments* **77**, 093110 (2006).

3. S. A. FitzGerald, **H. O. H. Churchill**, P. Korngut, C. B. Simmons, Y. E. Strangas, "Low-temperature rotational-vibrational spectroscopy of H_2 in crystalline C_{60}," *Physical Review B* **73**, 155409 (2006).

2. Wang Z. M., **H. Churchill**, C. E. George, and G. J. Salamo, "High anisotropy of lateral alignment in multilayered (In,Ga)As/GaAs(100) quantum dot structures," *Journal of Applied Physics* **96**, 6908 (2004).

1. **Hugh Churchill**, Henry Teng, and Robert M. Hazen, "Correlation of pH-dependent surface interaction forces to amino acid adsorption: Implications for the origin of life," *American Mineralogist* **89**, 1048 (2004).

Invited Publications

Hugh O. H. Churchill and Pablo Jarillo-Herrero, "Two-dimensional crystals: Phosphorus joins the family," *Nature Nanotechnology*, **9,** 330 (2014). (News and Views)

F. Kuemmeth, **H. O. H. Churchill**, P. K. Herring, C. M. Marcus, "Carbon nanotubes for coherent spintronic devices," *Materials Today* **13,** 18 (2010).

Invited Presentations

16. "The new atomic age: building things with atomically thin materials", Arkansas Junior Science and Humanities Symposium, Arkansas Tech University (March 2016).

15. "Building electronic devices with atomically thin materials", Arkansas INBRE Conference, Fayetteville, AR (November 2015).

14. "Transport and optoelectronics with two-dimensional semiconductors," Quantum Innovators Workshop, Institute for Quantum Computing, Waterloo, Ontario, Canada (October 2014).

13. "Optoelectronic devices based on electrically tunable *p-n* diodes in monolayer WSe_2," IEEE Summer Topicals Meeting Series, Montreal, Quebec, Canada (July 2014).

12. "Transport and optoelectronics with transition metal dichalcogenides," 1st Muju International Winter School Series, South Korea (February 2014).

11. "Transport and optoelectronics with transition metal dichalcogenides," Boston Area Carbon Nanoscience Plus (BACON+) meeting, Harvard University (October 2013).

10. "Tunneling spectroscopy and Andreev bound states in InSb nanowires with induced superconductivity," Workshop on Interferometry and Interactions in Non-equilibrium Meso- and Nano-systems, International Center for Theoretical Physics, Trieste, Italy (April 2013).

9. "Oscillatory Zero-Bias Features in Superconductor-Nanowire Devices," Winter Conference on Topological States of Matter, Aspen Center for Physics, Aspen, CO (January 2013).

8. "Transport Measurements of InSb Nanowires with Induced Superconductivity," Majorana Fermion Zero Modes in Solid-State Systems, Kavli Institute for Theoretical Physics, Santa Barbara, CA (December 2012).

7. "Fabrication of Few-electron Carbon Nanotube Double Quantum Dots," Boston Area Carbon Nanoscience (BACON) meeting, Massachusetts Institute of Technology (February 2011).

6. "Spin Relaxation in ^{13}C Nanotube Double Quantum Dots," International Winterschool on Electronic Properties of Novel Materials, Kirchberg, Austria (March 2010).

5. "Spin Relaxation in ^{13}C Nanotube Double Quantum Dots," seminar at National Research Council of Canada, Ottawa (March 2009).

4. "Spin Relaxation in ^{13}C Nanotube Double Quantum Dots," Boston Area Carbon Nanoscience (BACON) meeting, Harvard University (December 2008).

3. "Transport and Charge Sensing of Spin Blockaded ^{12}C and^{13}C Nanotube Double Quantum Dots," Workshop on Quantum Phenomena and Information, International Center for Theoretical Physics, Trieste, Italy (June 2008).

2. "A Ge/Si Heterostructure Nanowire Double Quantum Dot with Integrated Charge Sensor," Nanoscale Science and Engineering Center Research Exchange Seminar, Harvard University (January 2008).

1. "Low-temperature infrared spectroscopy of H_2 in solid C_{60}," APS March Meeting (March 2007).