

Department of Physics
University of California
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Education

University of California, Santa Barbara, Santa Barbara, CA Sep. 2013 – present

Ph.D., Physics, *Expected:* Spring 2019

- Topic: *High-field ESR investigations of coupled spins for biological applications*
- Advisors: Mark S. Sherwin, Ph.D and Song-I Han, Dr. rer. nat.

M.A., Physics, June 2016

- Topic: *High-field ESR investigations of coupled spins for biological applications*
- Advisors: Mark S. Sherwin, Ph.D. and Song-I Han, Dr. rer. nat.

Massachusetts Institute of Technology, Cambridge, MA Sep. 2009 – Jun. 2013

B.S., Physics, June 2013

- Senior Thesis: *High field DNP NMR probe design and applications in crystalline solids*
- Advisor: Robert G. Griffin, Ph.D.

Research Experience

Graduate Student Researcher Jan. 2014 – present
UCSB Department of Physics/Institute for Terahertz Science and Technology

- Applying microwave and terahertz magnetic resonance to investigate diverse physical, chemical, and biological systems, including semiconductors, transition metal/lanthanide complexes/catalysts, and photosynthetic membrane proteins.
- Developing hardware and software instrumentation for a magnetic resonance spectrometer operating at 240 GHz with the UCSB Free Electron Lasers.
- Operating and maintaining the UCSB Free Electron Laser, together with a team of four other scientists and engineers.

Undergraduate Research Assistant Jun. 2011 – Jul. 2013
MIT/Francis Bitter Magnet Lab

- Designed radio-frequency circuit and optimized 3D mechanical design for three-channel dynamic nuclear polarization (DNP) solid-state nuclear magnetic resonance (NMR) probe. Operated NMR spectrometer and 140 GHz gyrotron.
- Applied NMR to investigate DNP with lanthanides and to study quadrupolar nuclei, with applications to crystal hydrates.

Publications

Published/accepted papers in refereed journals

3. “Multi-step phase cycling with optomechanical phase shifters in a free electron laser-powered pulsed electron paramagnetic resonance spectrometer”
C. B. Wilson, S. Aronson, J. A. Clayton, S. J. Glaser, S. Han, M. S. Sherwin, *Phys. Chem. Chem. Phys.*, 2018, 20, 18097-18109
2. “Effect of water/glycerol polymorphism on dynamic nuclear polarization”
A. Leavesley, C. B. Wilson, M. S. Sherwin, S. Han, *Phys. Chem. Chem. Phys.*, 2018, 20, 9897-9903
1. “Reversal of paramagnetic effects by electron spin saturation”
S. K. Jain, T. A. Siaw, A. Equbal, C. B. Wilson, I. Kaminker, S. Han, *J. Phys. Chem. C*, 122, 5578-5598

Submitted papers

1. “Sub-terahertz spin pumping from coherent and incoherent antiferromagnetic magnons”
J. Li, C. B. Wilson, M. Lohmann, R. Cheng, M. Kavand, W. Yuan, M. Aldosary, N. Agladze, M. S. Sherwin, J. Shi, *Submitted 2018*

Presentations

Contributed talks

3. “Light-induced conformational changes in nitroxide-labeled proteorhodopsin detected by 240 GHz EPR at room temperature”
C. B. Wilson, C. Han, J. A. Clayton, M. S. Sherwin, S. Han, Rocky Mountain Conference on Magnetic Resonance, Snowbird, UT (July 2018)
2. “Demagnetization shifts in very high frequency pulsed electron paramagnetic resonance”
C. B. Wilson, J. A. Clayton, D. Edwards, N. Agladze, S. Han, M. S. Sherwin, Rocky Mountain Conference on Magnetic Resonance, Breckenridge, CO (July 2016)
1. “Electron-spin-echo decay of high-spin species at 240 GHz”
C. B. Wilson, J. A. Clayton, I. Kaminker, N. Agladze, D. Goldfarb, S. Han, M. S. Sherwin, Rocky Mountain Conference on Magnetic Resonance, Snowbird, UT (July 2015)

Poster presentations

3. “High-field EPR powered by a free electron laser”
C. B. Wilson, M. Kavand, J. A. Clayton, S. Aronson, S. Glaser, S. Han, M. S. Sherwin, Big Mag @ UCSB, Santa Barbara, CA (May 2018)
2. “240 GHz high-power pulsed EPR of aqueous solution samples”
C. B. Wilson, J. A. Clayton, S. Aronson, C. T. Han, S. J. Glaser, S. Han, M. S. Sherwin, International Society of Magnetic Resonance Conference/Rocky Mountain Conference on Magnetic Resonance, Quebec City, Canada (July 2017)
1. “Demagnetization shifts in very high frequency pulsed EPR”
C. B. Wilson, J. A. Clayton, D. Edwards, N. Agladze, S. Han, M. S. Sherwin, Rocky Mountain Conference on Magnetic Resonance, Breckenridge, CO (July 2016)

Awards

Student Awards

Rocky Mountain Conference Student Travel Award July 2018

Teaching Experience

Teaching Assistant

Analog Electronics <i>PHYS 127AL</i> with Prof. Everitt Lipman Department of Physics, University of California, Santa Barbara	Spring 2014
Basic Physics <i>PHYS 1</i> with Prof. Elizabeth Gwinn Department of Physics, University of California, Santa Barbara	Winter 2014
Physics Lab <i>PHYS 3L</i> with Prof. Everitt Lipman Department of Physics, University of California, Santa Barbara	Fall 2013
Electricity and Magnetism <i>8.02</i> with Prof. Max Tegmark Department of Physics, Massachusetts Institute of Technology	Spring 2013
Classical Mechanics <i>8.01</i> with Dr. Peter Dourmashkin Department of Physics, Massachusetts Institute of Technology	Fall 2011
Electricity and Magnetism <i>8.02</i> with Prof. Christoph Paus and Prof. Steve Nahn Department of Physics, Massachusetts Institute of Technology	Spring 2011

Technical Skills

- **Techniques:** Microwave and terahertz optics, electron paramagnetic resonance (EPR) spectroscopy, EPR of high-spin systems, EPR of biological systems, microwave electronics, visible optics, q-switched lasers, radio-frequency electronics, cryogenics, ultra-high vacuum, nuclear magnetic resonance spectroscopy (NMR), applied electron accelerator physics
- **Programming Languages:** Python, Matlab, LabView
- **Communication:** Extensive experience working in a multidisciplinary environment, passionate about communicating scientific concepts to people in different fields, and to non-scientists

Mentoring

University of California, Santa Barbara

Kunal Lakhanpal, physics July 2017 – present

- 2017 Summer UCSB SURF
- Supervising senior honors thesis

Sam Aronson, physics *Graduated class of 2017* June 2015 – June 2017

- 2015 Summer UCSB SURF
- Supervised senior honors thesis

Michael Balcewicz, physics *Graduated class of 2017* June 2015 – June 2017

- 2015 Summer UCSB SURF
- Supervised senior honors thesis

References

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Song-I Han

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Robert G. Griffin

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Director, Francis Bitter Magnet Laboratory
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