Alex Breitweiser | Quantum Physics

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Education

University of Pennsylvania — **Philadelphia, PA**
Ph.D., Physics — *August 2017 - Present*
- Studying the behavior of quantum sensors in optically active systems
- Research conducted with Lee Bassett

New York University — **New York, NY**
M.S., Physics — *September 2015–December 2016*
- Characterized emergent quantum phenomena in strongly correlated materials using x-ray spectroscopy
- Research conducted with L. Andrew Wray

University of Chicago — **Chicago, IL**
B.S. Mathematics & B.A. Physics, with General Honors — *September 2010–June 2014*

Research and Industry Experience

Quantum Engineering Laboratory, University of Pennsylvania — **Philadelphia, PA**
Graduate Student — *August 2017 - Present*
- Collected and analyzed laser microscopy data on hexagonal boron nitride samples

Wray Group, NYU Physics — **New York, NY**
Research Assistant, Assistant Research Scientist — *March 2016 - July 2017*
- Performed RIXS, ARPES, and XAS measurements using synchrotron radiation sources
- Ran ab-initio DFT calculations on high-performance supercomputing clusters to predict electronic structures
- Created and analyzed modified tight-binding models to find approximate electronic states

BitGravity (Tata Communications) — **Burlingame, CA**
Software Engineer — *June 2014–August 2015*
- Developed C++ and Python on Unix stack for a global CDN (Content Distribution Network)
- Analyzed streaming distributed data sets, averaging several terabytes per day
- Pioneered new and improved real-time analytics that led to large customer traffic increase
- Leveraged technologies such as Redis, Hadoop, and Impala
- Used software management tools like SVN/Git, Jenkins, JIRA, and Confluence

Teaching

University of Pennsylvania — **Philadelphia, PA**
Teaching Assistant — *Fall 2017*
- (Laboratory) Physics I: Mechanics and Wave Motion (Fall 2017)
- (Laboratory) Physics II: Electromagnetism and Radiation (Fall 2017)

New York University — **New York, NY**
Teaching Assistant — *Spring 2016 - Fall 2016*
- (Graduate) Quantum Mechanics I (Fall 2016)
- Computational Physics (Fall 2016)
- Mathematical Physics (Spring 2016)

University of Chicago — **Chicago, IL**
Reader — *Fall 2012 - Spring 2013*
- Introduction to Analysis and Linear Algebra (Fall 2012, Winter 2013, and Spring 2013)

Publications (First Authorships in bold)

- **"Spectroscopic characterization of symmetries, energetics and collective electron dynamics surrounding Mn1+ in a Prussian blue analogue", S. Alexander Breitweiser, Ruimin Qiao, L. Miao, H. He, Ali Firouzi, Shahrokh Motallebi, Christian W. Valencia, Hannah S. Israel, Mai Fujimoto, Wanli Yang, and L. Andrew Wray. (in preparation).**
- "Melting of Hund's rule correlations at the onset of large moment antiferromagnetism in doped URu2Si2", Haowei He, Lin Miao, S. Alexander Breitweiser, Andrew Gallagher, Ryan E. Baumbach, Sheng Ran, M. Brian Maple, Shih-Wen Huang, Yi-De Chuang, Jonathan Denlinger, Nicholas P. Butch, and L. Andrew Wray. (in preparation).
- "Momentum-resolved measurement of disorder-induced electronic states near a topological insulator Dirac point", Lin Miao, Yishuai Xu, Daniel Older, S. Alexander Breitweiser, Weida Wu, Rudro R. Biswas, and L. Andrew Wray. (in preparation).
- "Irreversible proliferation of magnetic moments at cleaved surfaces of the topological Kondo insulator SmB6 ", Haowei He, Lin Miao, Edwin Augustin, Janet Chiu, Surge Wexler, S. Alexander Breitweiser, Boyoun Kang, B. K. Cho, Chul-Hee Min, Friedrich Reinert, Yi-De Chuang, Jonathan Denlinger, and L. Andrew Wray, Phys. Rev. B 95:195126, May 2017.
- "Measurement of collective excitations in VO2 by resonant inelastic x-ray scattering" Haowei He, A. X. Gray, P. Granitzka, J. W. Jeong, N. P. Aetukuri, R. Kukreja, Lin Miao, S. Alexander Breitweiser, Jinpeng Wu, Y. B. Huang, P. Olalde-Velasco, J. Pelliciari, W. F. Schlotter, E. Arenholz, T. Schmitt, M. G. Samant, S. S. P. Parkin, H. A. DÃijrr, and L. Andrew Wray. Phys. Rev. B, 94:161119, Oct 2016.

Other programs

MIT, Johns Hopkins University — **Baltimore, MD**
Quantum Science Summer School — *Summer 2017*
- (Poster)"ARPES Investigation of Strong Point Defects on the Surface of a Topological Insulator"

Princeton University — **Princeton, NJ**
Summer School on Condensed Matter Physics — *Summer 2016*

University of Chicago — **Chicago, IL**
Directed Reading Program in Mathematics, Algebraic Number Theory — *Winter 2013*

University of Chicago (Center in Paris) — **Paris, France**
Paris Mathematics Program — *Spring 2012*

Standardized Tests

GRE Subject (2014): 960 Physics

GRE (2014): 170 Quantitative, 167 Verbal, 5.0 Writing

SAT (2009): 800 Mathematics, 790 Reading, 650 Writing

ACT (2009): 35 Composite, 35 Math, 35 Science, 34 English, 34 Reading, 31 Writing

Programming Languages

Most Experienced
- C & C++
- Python
- Matlab
- Julia

Intermediate
- Wolfram (Mathematica)
- Java

Familiar
- R
- Fortran