

# Brandon Anderson

## Curriculum Vitae

James Franck Institute  
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### Education

- 2006–2011 **Ph.D. Physics**, *University of Maryland*, College Park, MD.  
Dissertation: *Topics in Spin-Orbit Coupling in Cold Atoms and Semiconductors*  
Advisor: Victor Galitski
- 2002–2006 **B.S. Physics and Mathematics**, *University of Texas at Dallas*, Dallas, TX.  
(Honors: *Cum Laude*)

### Fields of Interest

Condensed Matter Physics, Atomic Molecular and Optical Physics, Topological Systems, Fractional Quantum Hall, Synthetic Gauge Fields and Spin-Orbit Coupling.

### Academic Experience

#### Research

- 2014– Present **Postdoctoral Scholar**, *Kathryn Levin*.  
Researched degenerate fermi gases and high- $T_c$  superconductors.
- 2012–2014 **Postdoctoral Research Assistant**, *Charles W. Clark*.  
Researched synthetic spin-orbit coupling and gauge fields.
- 2008–2011 **Research Assistant**, *Victor Galitski*.  
Researched spin-orbit coupled systems and atom interferometry.
- Summer 2007 **Research Assistant**, *Kevork Abazajian*.  
Calculated matrix elements of background neutrino scattering.
- Summer 2005 **REU Participant**, *David Collins*.  
Researched scaling behavior of ensemble implementations of quantum computers.
- 2005 **Undergraduate Researcher**, *Joseph Izen*.  
Searched for Charmonium bound states in the BaBar collider.

#### Teaching

- Summer 2016 **REU Mentor**, Co-mentored undergraduate research student Jennifer Crawford.
- Summer 2014 **SURF Mentor**, Co-mentored undergraduate research student Wilbur Shirley.
- Summer 2013 **SURF Mentor**, Co-mentored undergraduate research student Wilbur Shirley.

- 2006–2007 **Teaching Assistant**, *University of Maryland, Elizabeth Beise and Arpita Upadhyaya*, Physics 174: Physics Laboratory Introduction.  
Taught experimental methods to Physics majors.
- Spring 2007 **Teaching Assistant**, *University of Maryland, Fred Wellstood*, Physics 275: Experimental Physics I.  
Taught experimental methods to Physics majors.
- Fall 2006 **Teaching Assistant**, *University of Maryland, Nicholas Chant and Mark Laurenzi*, Physics 161: General Physics: Mechanics and Particle Dynamics.  
Led discussion sections in introductory physics.
- 2004–2006 **Supplemental Instruction Leader**, *UT Dallas Student Success Center*.  
Led problem solving sections for introductory physics courses and quantum mechanics.
- 2005 **Teaching Assistant**, *UT Dallas, Joseph Izen*.  
Led review sessions and graded for senior level quantum mechanics.
- 2004–2005 **UT Dallas Student Success Center**, *UT Dallas Student Success Center*.  
Tutored students in lower-division math courses.

## Publications

### Publications Summary

Total publications: 25

Phys. Rev. Lett./X: 8

Phys. Rev. A/B: 16

Special Issues: 1

### Full list

- R. Boyack, C.-T. Wu, **B. M. Anderson**, and K. Levin *Collective mode contributions to the Meissner effect: Fulde-Ferrell and pair-density wave superfluids*. Phys. Rev. B **95**, 214501 (2017)
- **B. M. Anderson**, L. W. Clark, J. Crawford, A. Glatz, I. S. Aronson, P. Scherpelz, L. Feng, C. Chin, K. Levin *Direct Lattice Shaking of Bose Condensates: Finite Momentum Superfluids*. Phys. Rev. Lett. **118**, 220401 (2017)
- C.-T. Wu, **B. M. Anderson**, W.-H. Hsiao, K. Levin. *Majorana zero modes in spintronics devices*. Phys. Rev. B **95**, 014519 (2017).
- **B. M. Anderson**, R. Ma, C. Owens, D. I. Schuster, J. Simon. *Engineering Topological Many-Body Materials in Microwave Cavity Arrays*. Phys. Rev. X **6**, 041043 (2016).
- **B. M. Anderson**, R. Boyack, C.-T. Wu, K. Levin. *Going beyond the BCS level in the superfluid path integral: A consistent treatment of electrodynamics and thermodynamics* Phys. Rev. B **93**, 180504 (2016).
- R. Boyack, **B. M. Anderson**, C.-T. Wu, K. Levin. *Gauge-invariant theories of linear response for strongly correlated superconductors*. Phys. Rev. B **94**, 094508 (2016).
- C.-T. Wu, **B. M. Anderson**, R. Boyack, K. Levin. *Quasi-condensation in two-dimensional Fermi gases*. Phys. Rev. Lett. **115**, 240401 (2015).

- **B. M. Anderson**, C.-T. Wu, R. Boyack, K. Levin. *Topological effects on transition temperatures and response functions in three-dimensional Fermi superfluids*. Phys. Rev. B **92**, 134523 (2015).
- E. Anisimovas, G. Zlabys, **B. M. Anderson**, G. Juzeliunas, A. Eckardt. *The role of real-space micromotion for bosonic and fermionic Floquet fractional Chern insulators*. Phys. Rev. B **91**, 245135 (2015).
- C.-T. Wu, **B. M. Anderson**, R. Boyack, K. Levin. *Signatures of pairing and spin-orbit coupling in correlation functions of Fermi gases*. Phys. Rev. B **91**, 220504(R) 2015.
- L.-C. Ha, L. W. Clark, C. V. Parker, **B. M. Anderson**, C. Chin. *Roton-Maxon Excitation Spectrum of Bose Condensates in a Shaken Optical Lattice*. Phys. Rev. Lett. **113**, 165301 (2014).
- X. Chen, M. Rabinovic, **B. M. Anderson**, L. Santos. *Ring model for trapped condensates with synthetic spin-orbit coupling*. Phys. Rev. Lett. **113**, 165301 (2014).
- W. E. Shirley, **B. M. Anderson**, C. W. Clark, R. M. Wilson. *Half-Quantum Vortex Molecules in a Binary Dipolar Bose Gas*. Phys. Rev. Lett. **113**, 165301 (2014).
- Y.-H. Wang, **B. M. Anderson** and C. W. Clark. *Spinor Bose-Einstein Condensates of Positronium Condensates*. Phys. Rev. A **89**, 043624 (2014).
- R. M. Wilson, **B. M. Anderson** and C. W. Clark. *Meron Ground State of Rashba Spin-Orbit-Coupled Dipolar Bosons*. Phys. Rev. Lett. **111**, 185303 (2013).
- **B. M. Anderson**, I. B. Spielman, G. Juzeliūnas. *Magnetically generated spin-orbit coupling for ultracold atoms*. Phys. Rev. Lett. **111**, 125301 (2013).
- S. De, D. L. Campbell, R. M. Price, A. Putra, **B. M. Anderson** and I. B. Spielman. *Quenched binary Bose-Einstein condensates: Spin-domain formation and coarsening*. Phys. Rev. A **89**, 033631 (2014).
- **B. M. Anderson** and C. W. Clark. *Three-Dimensional Spin-Orbit Coupling in a Trap*. J. Phys. B: At. Mol. Opt. Phys. **46** 134003 (2013).
- J. Larson, **B. M. Anderson** and A. Altland *Chaos-driven dynamics in spin-orbit coupled atomic gases*. Phys. Rev. A **87**, 013624 (2013).
- **B. M. Anderson**, G. Juzeliūnas, V. M Galitski and I. B Spielman. *Synthetic 3D Spin-Orbit Coupling*. Phys. Rev. Lett. **108**, 235301 (2012).
- S. Takei, C.-H. Lin, **B. M. Anderson** and V. Galitski. *Low-density molecular gas of tightly-bound Rashba-Dresselhaus fermions*. Phys. Rev. A **85**, 023626 (2012).
- **B. M. Anderson**, J. M. Taylor and V. M. Galitski. *Interferometry with Synthetic Gauge Fields*. Phys. Rev. A **83**, 031602(R) (2011).
- **B. Anderson**, T. D. Stanescu and V. Galitski. *Bulk Spin-Hall Effect*. Phys. Rev. B **81**, 121304(R) (2009).
- T. Stanescu, **B. Anderson** and V. Galitski. *Spin-orbit Coupled Bose-Einstein Condensates*. Phys. Rev. A **78**, 023616 (2008).

- **B. M. Anderson** and D. Collins. *Polarization requirements for ensemble implementations of quantum algorithms with a single-bit output*. Phys. Rev. A **72**, 042337 (2005).

## Invited Talks

- *Quasi-condensation in trapped two-dimensional Fermi gases*, University of Heidelberg, July 19th, 2016, Heidelberg, Germany.
- *Quasi-condensation in trapped two-dimensional Fermi gases*, APS March Meeting 2016, March 16th, 2016, Baltimore, Maryland.
- *Synthetic Spin-Orbit Coupling Without Light*, Vilnius University, May 22nd, 2014, Vilnius, Lithuania.
- *Synthetic Spin-Orbit Coupling Without Light*, The Institute of Photonic Sciences: ICFO, May 19th, 2014, Barcelona, Spain.
- *Synthetic Spin-Orbit Coupling Without Light*, University of Utrecht, May 15th, 2014, Utrecht, The Netherlands.
- *Synthetic Spin-Orbit Coupling Without Light*, George Mason University, May 2nd, 2014, Fairfax, Virginia.
- *Synthetic Spin-Orbit Coupling*, James Franck Institute, University of Chicago, January 24th, 2014, Chicago, Illinois.
- *Synthetic Spin-Orbit Coupling: Ideal and Non-Ideal Limit*, University of Kaiserslautern, January 28th, 2013, Kaiserslautern, Germany.
- *Synthetic Spin-Orbit Coupling*, Quantum Over Brunch, George Mason University, September 21st, 2012, Fairfax, Virginia.
- *Exotic 3D Spin-Orbit Couplings*, Institute of Theoretical Physics and Astronomy, Vilnius University, September 22nd, 2011, Vilnius, Lithuania.
- *Interferometry with Synthetic Gauge Fields*, Winter Colloquium on the Physics of Quantum Electronics, January 2nd - 6th, 2011, Snowbird, Utah.

## Computer skills

Operating Systems	Linux, Mac OS X, Windows.	Programming Languages	C, C++, Python, Fortran, Java, HTML, L <sup>A</sup> T <sub>E</sub> X.
Computation Software	Mathematica, MATLAB.		

## Honors, Awards, & Fellowships

- 2006–2008 **Maryland Physics Department Fellowship**, *University of Maryland*.
- Summer 2005 **NSF Research Experiences for Undergraduates**, *Bucknell University*.
- 2005 **Minnie K. Patton Foundation Scholarship**, *University of Texas at Dallas*.

2004–2006 **Dean's List**, *University of Texas at Dallas*.

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## References

### **Kathryn Levin**

*Professor of Physics*

Postdoc supervisor

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### **Jonathan Simon**

*Neubauer Family Assistant Professor*

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### **Charles Clark**

*Fellow, Joint Quantum Institute*

Postdoc supervisor

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### **Victor Galitski**

*Professor of Physics*

Ph.D. thesis supervisor

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### **Gediminas Juzeliūnas**

*Principal Research Fellow and Director*

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