Ben Andrew Olsen

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Education

2011 **Ph. D. in Physics,** Princeton University
Dissertation: *Optical Pumping and Spectroscopy of Alkali Vapors in Magnetic Fields* (Dissertation link)
Advisor: Dr. William Happer

2006 **B. S. with Honors in Physics,** California Institute of Technology
Senior Thesis: *The Effects of Selective Doping on Electron Transport in Two-Dimensional Electron Gases*
Advisor: Dr. James Eisenstein

Professional Appointments

2016– **Postdoctoral research fellow** University of Toronto Department of Physics
Advisor: Dr. Joseph H. Thywissen

2015–2016 **Physicist** AOSense, Inc. Inertial Sensors Divison, Sunnyvale, CA
Supervisor: Dr. Michael R. Matthews

2011–2015 **Postdoctoral research associate** Rice University Department of Physics & Astronomy and Rice Quantum Institute
Advisor: Dr. Randall G. Hulet

Refereed Publications

8. *Observation of Quantum-Limited Spin Transport in Strongly Interacting Two-Dimensional Fermi Gases*
C. Luciuk, S. Smale, F. Böttcher, H. Sharum, **B. A. Olsen**, S. Trotzky, T. Enss, and J. H. Thywissen
Physical Review Letters **118**, 130405 (2017) doi:10.1103/PhysRevLett.118.130405

7. *1D to 3D Crossover of a Spin-Imbalanced Fermi Gas*
M. C. Revelle, J. A. Fry, **B. A. Olsen**, and R. G. Hulet
Physical Review Letters **117**, 235301 (2016) doi:10.1103/PhysRevLett.117.235301

6. *Phase diagram of a strongly interacting spin-imbalanced Fermi gas*
B. A. Olsen, M. C. Revelle, J. A. Fry, D. E. Sheehy, and R. G. Hulet
Physical Review A **92**, 063616 (2015) doi:10.1103/PhysRevA.92.063616

5. *Spin-velocity correlations of optically pumped atoms*
R. Marsland III, B. H. McGuyer, **B. A. Olsen**, and W. Happer
Physical Review A **86**, 023404 (2012) doi:10.1103/PhysRevA.86.023404

4. *Cusp kernels for velocity-changing collisions*
   B. H. McGuyer, R. Marsland III, **B. A. Olsen**, and W. Happer
   Physical Review Letters **108**, 183202 (2012) doi:10.1103/PhysRevLett.108.183202

3. *Optical pumping and spectroscopy of Cs vapor at high magnetic field*
   B. A. Olsen, B. Patton, Y.-Y. Jau, and W. Happer
   Physical Review A **84**, 063410 (2011) doi:10.1103/PhysRevA.84.063410

2. *Transfer of spin angular momentum from Cs vapor to nearby Cs salts through laser-induced spin currents*
   K. Ishikawa, B. Patton, **B. A. Olsen**, Y.-Y. Jau, and W. Happer
   Physical Review A **83**, 063410 (2011) doi:10.1103/PhysRevA.83.063410

1. *Temperature-insensitive laser frequency locking near absorption lines*
   N. Kostinski, **B. A. Olsen**, R. Marsland III, B. H. McGuyer, and W. Happer
   Review of Scientific Instruments **82**, 033114 (2011) doi:10.1063/1.3574221

Teaching Experience

2017 **Instructor** *Phy 326: Advanced Physics Laboratory*
University of Toronto—3rd, 4th year physics majors (Course website link)
Experimental lab course including NMR, magnetometry, and optical tweezers

2016–2017 **Lead physics instructor & curriculum development**
Tapia STEM Camps, Richard Tapia Center for Excellence & Equity
Rice University—8th–12th Grade (Camp summary link)
PBL combining physics and design for STEM graphic and oral presentations

2015 **Guest lecturer** *Physics 202: Modern Physics*
Rice University—2nd year STEM majors
Professor: Dr. Randall G. Hulet (Course outline link)
Guest lecture introducing concepts of general relativity

2013–2015 **Guest lecturer** *Physics 311/312: Introduction To Quantum Physics I/II*
Rice University—3rd year physics majors
Professor: Dr. Randall G. Hulet (Course outline link)
Seven lessons blending lecture, small-group discussion, and problem solving

2010–2011 **Assistant for instruction** *ISC 231: An Integrated, Quantitative Introduction to the Natural Sciences, Laboratory Section*
Princeton University—1st year STEM majors
Instructor: Dr. Eva-Maria Schoetz (Course outline link)
Biophysics lab experiments and data analysis. I designed and led a workshop on MATLAB for data analysis and simulation.

2009–2010 **Instructor** *Physics & Science Reasoning*
Princeton University Preparatory Program—12th grade
Director: Dr. Jason Klugman (Program website link)

Ten-week summer course on critical thinking and problem-solving skills in the context of physics

2005 **Teaching assistant** *Ph 6: Physics Laboratory*
California Institute of Technology—2nd year physics majors
Instructor: Dr. Frank Rice (Course website link)
Experimental lab and problem sessions on topics including mass spectrometry, Michelson interferometers, and electron diffraction

2005 **Teaching assistant** *Ph 5: Analog Electronics for Physicists*
California Institute of Technology—2nd year physics majors
Instructor: Dr. Virginio Sannibale (Course website link)
Experimental lab and problem sessions on topics including passive circuit elements, op-amps, and phase-locked loops

2008–2014 **Freelance individual tutor**
Tutored students one-on-one in high-school physics (both calculus- and algebra-based) and mathematics (single- and multivariable calculus), ACT, SAT, and SAT Physics test preparation, undergraduate mechanics and electromagnetism.

Press & Awards

2017 **Article: STEM Camps Showcase PBL**
National Science Teachers Association Reports, September, 2017 (Article link)

2008 **American Physical Society DAMOP Meeting Student Travel Stipend**

2008 **Experimental NMR Conference Student Travel Stipend**

2005 **Dr. and Mrs. Peter S. Cross Summer Undergraduate Research Fellowship**
For research through the California Institute of Technology SURF program

Public Outreach

2017 **Science Rendezvous**
University of Toronto, Toronto, ON, Canada
Lab tours and interactive physics demos during nationwide STEM festival

2017 **Let's Talk Science Challenge**
University of Toronto, Toronto, ON, Canada
Supervision and judging for STEM trivia and hands-on design challenge for groups of 6th–8th grade students

2009–2011 **Quantum Mechanics for 8th Graders**
John Witherspoon Middle School, Princeton, NJ
Interactive lesson with demonstrations on waves, sound, light, spectroscopy and the development of quantum theory

2009, 2010 **North Jersey Regional Science Fair**
Rutgers University, New Brunswick, NJ
Volunteer Judge for 8th–12th grade physics projects

Pedagogical Training

2018 **THE500 - Teaching in Higher Education**
University of Toronto Professional and International Programs Office
(Course outline link)

2016 **Advancing Learning Through Evidence-Based STEM Teaching**
CIRTL Network online through edX (Course outline link)

2014 **An Introduction to Evidence-Based Undergraduate STEM Teaching**
Vanderbilt University online through Coursera (Course outline link)

2011 **Teaching transcript, McGraw Center for Teaching & Learning**
Princeton University (Program website link)

Presentations

June 2017 **Quantum-limited spin transport in strongly interacting 2D Fermi gases**
Contributed Talk—American Physical Society DAMOP Meeting, Sacramento, CA

May 2016 **Ultracold atomic superfluids in 1D, 3D, and in between**
Quantum Optics Seminar—University of Toronto, ON, Canada

Jun 2015 **Superfluidity in strongly interacting spin-polarized Fermi gases**
Contributed Talk—American Physical Society DAMOP Meeting, Columbus, OH

Apr 2015 **Ultracold atomic superfluids in 1D, 3D, and in between**
Scientific Seminar—AOSense, Inc., Sunnyvale, CA

Mar 2015 **Superfluidity in strongly interacting spin-polarized Fermi gases**
Contributed Talk—American Physical Society March Meeting, San Antonio, TX

Feb 2015 **Ultracold atomic superfluids in 1D, 3D, and in between**
Physics Colloquium—Central Washington University, Ellensburg, WA

Jan 2015 **Ultracold atomic superfluids in 1D, 3D, and in between**
Physics Colloquium—Harvey Mudd College, Claremont, CA

Jun 2014 **Quasi-1D Fermi gases with spin imbalance**
Contributed Talk—American Physical Society DAMOP Meeting, Madison, WI

Jun 2013 **Spin-imbalanced Fermi gases from 1D to 3D**
Contributed Talk—American Physical Society DAMOP Meeting, Québec City, Québec

Jun 2011 **Anti-relaxation coatings at high magnetic field**
Contributed Talk—American Physical Society DAMOP Meeting, Atlanta, GA

May 2010 **Simulations of the spatial dependence of populations in high field optical pumping**
Contributed Talk—American Physical Society DAMOP Meeting, Houston, TX

May 2009 **Spatial polarization profile in optically pumped alkali vapors**
Contributed Talk—American Physical Society DAMOP Meeting, Charlottesville, VA

Mar 2009 **Spatial polarization profile in optically pumped alkali vapors**
Contributed Poster—Experimental NMR Conference, Pacific Grove, CA

May 2008 **Spin-exchange optical pumping of alkali salts**
Contributed Talk—American Physical Society DAMOP Meeting, State College, PA

Mar 2008 **Spin-exchange optical pumping of alkali salts**
Contributed Poster—Experimental NMR Conference, Pacific Grove, CA

Nov 2005 **Near IR detector arrays for the SuperNova Acceleration Probe**
Contributed Talk—Southern California Conference for Undergraduate Research, UC Riverside, Thousand Oaks, CA