

Arne Schwettmann

Curriculum Vitae

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EDUCATION

- 2012 **Ph.D. in Physics**
Department of Physics, The University of Oklahoma, Norman, Oklahoma
Dissertation: “Atom chip setup for cold Rydberg atom experiments”
Advisor: James P. Shaffer
- 2003 **M.S. in Physics**
Department of Physics, University of North Texas, Denton, Texas
Title: “Ballistic deposition: global scaling and local time series”
Advisor: Paolo Grigolini
- 2001 **B.S. equivalent in Physics with a minor in Computer Science**
Fachbereich Physik, Universität Hannover, Hannover, Germany

RESEARCH EXPERIENCE

- 2014 – present **Assistant Professor**
Department of Physics, The University of Oklahoma, Norman, Oklahoma
- 2012 – 2014 **Postdoctoral Research Associate**
Joint Quantum Institute, NIST and the University of Maryland,
Gaithersburg, Maryland
Supervisor: Paul Lett
- 2005 – 2011 **Research Assistant**
Department of Physics, The University of Oklahoma, Norman, Oklahoma
Supervisor: James P. Shaffer
Designed and implemented an atom chip setup for magnetic trapping of Rb atoms; used electromagnetically induced transparency to probe Rydberg levels; calculated long-range Rydberg pair potentials using parallel computing
- 2003 – 2004 **Research Assistant**
Department of Physics, University of North Texas, Denton, Texas
Supervisor: Paolo Grigolini

TEACHING EXPERIENCE

- 2004 – 2008 **Teaching Assistant**
Department of Physics, The University of Oklahoma, Norman, Oklahoma
Course title: “Physics for Life Science Majors”
- 2002 – 2003 **Teaching Assistant**
Department of Physics, University of North Texas, Denton, Texas
Course title: “Introduction to Astronomy”

AWARDS

- 2012 **Nielsen Prize for Outstanding Dissertation in Research**
Department of Physics, The University of Oklahoma, Norman, Oklahoma

PUBLICATIONS

Refereed Journal Articles

16. J. Sedlacek, A. Schwettmann, H. Kübler, and J. P. Shaffer, “Atom based vector microwave electrometry using rubidium Rydberg atoms in a vapor cell,” *Phys. Rev. Lett.* **111**, 063001 (2013).
15. H. K. Pechkis, J. P. Wrubel, A. Schwettmann, P. F. Griffin, R. Barnett, E. Tiesinga, and P. D. Lett, “Spinor dynamics in an antiferromagnetic spin-1 thermal Bose gas,” *Phys. Rev. Lett.* **111** 025301 (2013).
14. J. A. Sedlacek, A. Schwettmann, H. Kübler, R. Löw, T. Pfau, and J. P. Shaffer, “Microwave electrometry with Rydberg atoms in a vapour cell using bright atomic resonances,” *Nature Phys.* **8**, 819-824 (2012).
13. A. Schwettmann, J. Sedlacek, and J. P. Shaffer, “FPGA-based locking circuit for external cavity diode laser frequency stabilization,” *Rev. Sci. Inst.* **82**, 103103 (2011).
12. J. S. Cabral, J. M. Kondo, L. F. Goncalves, V. A. Nascimento, L. G. Marcassa, D. Booth, J. Tallant, A. Schwettmann, K. R. Overstreet, J. Sedlacek, and J. P. Shaffer, “Effects of electric fields on ultracold Rydberg atom interactions,” *J. Phys. B: At. Mol. Opt. Phys.* **44**, 184007 (2011).
11. K. R. Overstreet, A. Schwettmann, J. Tallant, D. Booth, and J. P. Shaffer, “Observation of electric-field-induced Cs Rydberg atom macrodimers,” *Nature Phys.* **5**, 581 - 585 (2009).
10. V. A. Nascimento, L. L. Caliri, A. Schwettmann, J. P. Shaffer, and L. G. Marcassa, “Electric Field Effects in the Excitation of Cold Rydberg-Atom Pairs,” *Phys. Rev. Lett.* **102**, 213201 (2009).

9. A. Schwettmann, K. Richard Overstreet, J. Tallant, and J. P. Shaffer, "Analysis of long-range Cs Rydberg potential wells," *J. Mod. Opt.* **54**, 2551-2562 (2007).
8. K. R. Overstreet, A. Schwettmann, J. Tallant, and J. P. Shaffer, "Photoinitiated collisions between cold Cs Rydberg atoms," *Phys. Rev. A* **76**, 011403(R) (2007).
7. A. Schwettmann, C. McGuffey, S. Chauhan, K. R. Overstreet, and J. P. Shaffer, "Tunable four-pass narrow spectral bandwidth amplifier for use at ~ 508 nm," *Appl. Opt.* **46** 1310-1315 (2007).
6. A. Schwettmann, J. Crawford, K. R. Overstreet, and J. P. Shaffer, "Cold Cs Rydberg-gas interactions," *Phys. Rev. A* **74**, 020701(R) (2006).
5. J. Tallant, K. R. Overstreet, A. Schwettmann, and J. P. Shaffer, "Sub-Doppler magneto-optical trap temperatures measured using Rydberg tagging," *Phys. Rev. A* **74**, 023410 (2006).
4. K. Overstreet, P. Zabawa, J. Tallant, A. Schwettmann, and J. P. Shaffer, "Multiple scattering and the density distribution of a Cs MOT," *Optics Express* **13**, 9672 (2005).
3. A. Schwettmann, J. Franklin, K. R. Overstreet, and J. P. Shaffer, "Stark slowing asymmetric rotors: Weak-field-seeking states and nonadiabatic transitions," *J. Chem. Phys.* **123**, 194305 (2005).
2. M. Ignaccolo, A. Schwettmann, R. Failla, M. C. Storrie-Lombardi, and P. Grigolini, "Stromatolites: why do we care?" *Chaos, Solitons & Fractals*, **20**, 145-148 (2004).
1. R. Failla, P. Grigolini, M. Ignaccolo, and A. Schwettmann, "Random growth of interfaces as a subordinated process," *Phys. Rev. E* **70**, 010101 (2004).

INVITED TALKS

7. "Collisions in an ultracold sodium quantum gas," Department of Physics colloquium, Wichita State University, Wichita, KS (January 28, 2015).
6. "Spin dynamics in an ultracold sodium quantum gas," Department of Physics colloquium, The University of Oklahoma, Norman, OK (February 27, 2014).
5. "Spin dynamics in an ultracold sodium quantum gas," Department of Physics colloquium, University of Reno, NV (February 21, 2014).
4. "Spin dynamics in an ultracold sodium quantum gas," Department of Physics colloquium, California State University, Fullerton, CA (February 4, 2014).
3. "Spin dynamics in an ultracold sodium quantum gas," Department of Physics colloquium, Haverford College, PA (November 20, 2013).

2. “Probing Rydberg atoms using nonlinear optics,” Quantum Measurement Division seminar, National Institute of Standards and Technology, MD (October 20, 2011).
1. “Cs Rydberg atom macrodimers,” Cheng Chin research group seminar, University of Chicago, IL (March 12, 2010).

CONFERENCE ACTIVITY

Contributed Talks

16. D. Fahey, Z. Glassman, A. Schwettmann, G. Summy, R. Wilson, E. Tiesinga, and P. Lett, “Spinor dynamics in a partially Bose-condensed sodium gas,” DAMOP, Columbus, OH (June 8-12, 2015). (co-author, presented by D. Fahey)
15. A. Schwettmann, G. Summy, H. Pechkis, J. Wrubel, R. Barnett, R. Wilson, E. Tiesinga, and P. Lett, “Reversal of spin dynamics in an antiferromagnetic $F = 1$ spinor Bose-Einstein condensate,” DAMOP, Madison, WI (June 2-6, 2014).
14. H. K. Pechkis, J. P. Wrubel, A. Schwettmann, P. F. Griffin, R. Barnett, E. Tiesinga, and P. D. Lett, “Spinor dynamics in a ^{23}Na spin-1 thermal Bose gas,” DAMOP, Quebec City, Canada (June 3-7, 2013).
13. J. Sedlacek, A. Schwettmann, H. Fan, and J. P. Shaffer, “Polarization Dependent Dark Resonances in Electromagnetically Induced Transparency with Rydberg Atoms,” DAMOP, Orange County, CA (June 4-8, 2012). (co-author, presented by J. Sedlacek)
12. D. Booth, J. Tallant, A. Schwettmann, and J. P. Shaffer, “Anisotropic Rydberg Interactions,” DAMOP, Orange County, CA (June 4-8, 2012). (co-author, presented by D. Booth)
11. A. Schwettmann, J. Sedlacek, C. Gentry, and J. P. Shaffer, “Probing RF electric fields with Rydberg atoms,” DAMOP, Atlanta, GA (June 13-17, 2011).
10. D. Booth, J. Tallant, A. Schwettmann, J. P. Shaffer, J. Cabral, J. Kondo, L. Goncalves, and L. Marcassa, “Electric field effects on decay of Rb Rydberg atom pairs,” DAMOP, Houston, TX (May 25-29, 2010). (co-author, presented by D. Booth)
9. A. Schwettmann, K. R. Overstreet, J. Tallant, D. Booth, and J. P. Shaffer, “Observation of Cs Rydberg atom macrodimers,” DAMOP, Charlottesville, VA (May 18-23, 2009).
8. A. Schwettmann, V. A. Nascimento, L. L. Caliri, J. P. Shaffer, and L. G. Marcassa, “Electric field effects on cold Rydberg atom pair excitation,” DAMOP, State College, PA (May 27-31, 2008).

7. K. R. Overstreet, A. Schwettmann, J. Tallant, and J. P. Shaffer, "Long Range, Cold Cs Rydberg Atom-Rydberg Atom Molecules," DAMOP, State College, PA (May 27-31, 2008). (co-author, presented by K. R. Overstreet)
6. J. Tallant, K. R. Overstreet, A. Schwettmann, and J. P. Shaffer, "Dipole-Dipole Interactions in a Cold Cs Rydberg Gas," DAMOP, State College, PA (May 27-31, 2008). (co-author, presented by J. Tallant)
5. A. Schwettmann, K. R. Overstreet, J. Tallant, and J. P. Shaffer, "Long-range Cs Rydberg molecules," DAMOP, Calgary, CA (June 5-9, 2007).
4. K. R. Overstreet, A. Schwettmann, J. Tallant, and J. P. Shaffer, "Resonant collision processes in a Cs Rydberg gas," DAMOP Calgary, CA (June 5-9, 2007). (co-author, presented by K. R. Overstreet)
3. A. Schwettmann, J. Crawford, K. R. Overstreet, and J. P. Shaffer, "Rydberg Atom - Rydberg Atom Interaction Potentials," DAMOP, Knoxville, TN (May 16-20, 2006).
2. A. Schwettmann, J. Franklin, K. R. Overstreet, J. Tallant, and J. P. Shaffer, "Stark Slowing Asymmetric Rotors," DAMOP, Knoxville, TN (May 16-20, 2006).
1. K. R. Overstreet, J. Tallant, J. Crawford, A. Schwettmann, and J. P. Shaffer, "Cold Cs Rydberg Atom Collisions: Line Shifts, Broadening and Inelastic Collisions," DAMOP, Lincoln, NE (May 17-21, 2005). (co-author, presented by K. R. Overstreet)

Posters

14. A. Foster, D. Nematollahi, A. Schwettmann, and E. Tiesinga, "Spinor Bose-Einstein condensates subject to time-dependent microwave dressing: Coherent states vs. Fock states," DAMOP, Columbus, OH (June 8-12, 2015).
13. D. Nematollahi, A. Foster, K. Yates, J. Altermatt, H. Lee, Q. Zhang, and A. Schwettmann, "Experimental apparatus to study cold collisions in sodium spinor Bose-Einstein condensates," DAMOP, Columbus, OH (June 8-12, 2015).
12. A. Schwettmann, H. K. Pechkis, J. P. Wrubel, R. Barnett, E. Tiesinga, and P. D. Lett, "Decoherence of spin oscillations in an ultracold $F=1$ sodium gas," DAMOP, Quebec City, Canada (June 3-7, 2013).
11. H. Fan, J. Sedlacek, A. Schwettmann, J. P. Shaffer, H. Kübler, and T. Pfau, "Quantum Assisted Sensing Using Rydberg Atom Electromagnetically Induced Transparency," DAMOP, Orange County, CA (June 4-8, 2012).
10. J. Sedlacek, A. Schwettmann, and J. P. Shaffer, "Generation of 480nm cw light for Rydberg excitation of Rb," DAMOP, Atlanta, GA (June 13-17, 2011).

9. A. Schwettmann, J. Sedlacek, L. Trafford, and J. P. Shaffer, "Atom-chip trap for Rydberg atom experiments," DAMOP, Houston, TX (May 25-29, 2010).
8. J. Tallant, D. Booth, A. Schwettmann, and J. P. Shaffer, "Rydberg tagging time-of-flight imaging: An improved apparatus for studying many-body processes," DAMOP, Houston, TX (May 25-29, 2010).
7. A. Schwettmann, J. Tallant, D. Booth, C. E. Savell and J. P. Shaffer, "Decoherence of a Rb BEC caused by stray magnetic fields and surface effects," DAMOP, Charlottesville, VA (May 19-23, 2009).
6. J. Tallant, A. Schwettmann, D. W. Booth, and J. P. Shaffer, "Rydberg tagging time-of-flight imaging to study 3-body recombination," DAMOP, Charlottesville, VA (May 19-23, 2009).
5. D. Booth, A. Schwettman, J. P. Shaffer, J. S. Cabral, L. F. Goncalvez, L. G. Marcassa, "Electric field effects on cold Rydberg atom nD-nD pair collisions," DAMOP, Charlottesville, VA (May 19-23, 2009).
4. J. Tallant, K. R. Overstreet, A. Schwettmann, and J. P. Shaffer, "Rydberg tagging time-of-flight imaging to study ultracold collisions," DAMOP, Calgary, CA (June 5-9, 2007).
3. K. R. Overstreet, P. Zabawa, J. Tallant, A. Schwettmann, J. Crawford, and J. P. Shaffer, "Abel Inversion for study of multiple scattering in a Cs magneto-optical trap," DAMOP, Knoxville, TN (May 16-20, 2006).
2. J. Tallant, K. R. Overstreet, A. Schwettmann, and J. P. Shaffer, "Temperature Measurements Using Rydberg Tagging," DAMOP, Knoxville, TN (May 16-20, 2006).
1. A. Schwettmann, J. Franklin, K. R. Overstreet, J. Tallant, J. Crawford, and J. P. Shaffer, "Stark Slowing Asymmetric Rotors: Weak Field Seeking States and Nonadiabatic Transitions," DAMOP, Lincoln, NE (May 17-21, 2005).