

Joshua M. Grossman

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Education

State University of New York at Stony Brook, Stony Brook, NY

Doctor of Philosophy in Physics, Spring 2002

- Research Thesis: "Spectroscopy of Trapped Francium."
- Advisor Dr. Luis A. Orozco.

Williams College, Williamstown, MA

Bachelor of Arts in Physics, June 1996

- Honors, Cum Laude, Sigma Xi, Sigma Pi Sigma, Dean's List 5 of 8 semesters.
- Research Thesis: "Realizing Generalized Quantum Measurements on the Polarization of Photons."

Experience

Saint Mary's College of Maryland, Saint Mary's City, MD

Assistant Professor, Fall 2007 to present, full time

- Teach General Physics I & II, College Physics II, Quantum Mechanics, Statistical Mechanics, and First Year Seminar: It's About Time.
- Research microscopic magnetic surface traps for individual neutral atoms and direct a Saint Mary's Project student in associated research project.
- Research quantum walks and implementation of positive operator-valued measurements (POVMs) on photon polarization states.
- Serve on Core Curriculum Committee; served on Physics Faculty Search Committee.

Adelphi University, Department of Physics, Garden City, NY

Assistant Professor, Fall 2004 to Spring 2007, full time

- Taught Perspectives in Physics, The Ascent of Physics, Electromagnetic Theory, Physics Colloquium, Physics for Science Majors I & II Labs, and Independent Study courses on Laser Cooling & Trapping and Atomic Physics.
- Researched microscopic magnetic surface traps for individual neutral atoms and directed nine undergraduate students (one Honors Thesis student) and one high school student in associated research projects.
- Researched implementation of positive operator-valued measurements (POVMs) on photon polarization states and directed two students (one Honors Thesis student) in research.
- Organized new series of Physics Department colloquia.
- Designed two new courses: How Things Work and Physics Colloquium.
- Initiated new MS program in physics with a concentration in optics; chaired Graduate Admissions Committee.
- Served on Committee to Restructure the Office of Sponsored Programs, search committee for Associate Provost for Research, and College of Arts & Sciences Academic Affairs Committee.

National Institute of Standards and Technology, Gaithersburg, MD

Post-Doctoral Researcher in Dr. William D. Phillip's Laser Cooling & Trapping Group, Summer 2002 to Summer 2004, full time

- Studied quantum random walks and quantum chaos with ultra-cold atoms, photoassociation of Bose-Einstein condensates and properties of condensates loaded in optical lattices.
- Trained graduate and exchange students on research and experimental techniques.
- Operated, maintained, and upgraded apparatus incorporating lasers, optics, ultra-high vacuum technology, data acquisition systems, imaging systems, and electronics.

State University of New York at Stony Brook, Stony Brook, NY*Research Assistant*, Spring 1998 to Spring 2002, full time

- Performed precision measurements of hyperfine splittings to obtain the hyperfine anomaly and nuclear magnetization distribution information in a chain of five francium isotopes.
- Located the previously unobserved 7D states of francium and measured their energies, hyperfine splittings, and lifetimes.
- Designed and constructed new apparatus for efficient trapping of francium.
- Worked with technologies including lasers, ultra-high vacuum, ion transport, LINAC, data acquisition, programming, and electronics.

Teaching Assistant and Research Assistant, Spring to Fall 1997, part time

- Taught laboratory sections, graded work and exams for introductory physics, and tutored students.
- Participated in research on laser cooling with Dr. Harold Metcalf.

Williams College, Williamstown, MA*Research Assistant, Teaching Assistant, and Tutor*, Fall 1993 and Fall 1994 to Spring 1996, part time

- Designed methods for realizing several classes of positive operator valued measurements and investigated quantum teleportation via noisy channels, working with Dr. William K. Wootters.
- Helped with lab instruction and grading of introductory and mid-level physics classes.
- Tutored physics students on an individual basis and as part of Math & Science Resource Center.

Naval Air Warfare Center Aircraft Division, Patuxent River Naval Air Station, MD*Guest Researcher* in laboratory of Dr. Frank Narducci, Summer 2007, part time

- Researched Raman transitions in laser-cooled atoms.
- Assisted in supervision of high-school, undergraduate, and graduate student researchers.

Grants Awarded

- Research Corporation's Cottrell College Science Award in November 2005.
- Bauder Fund grant from American Association of Physics Teachers in July 2005.

Publications

“Quantum walk analog of optical phenomena,” D.D. Powell and J.M. Grossman, in preparation for submission to Phys. Rev. A.

“Frames of Reference in the Classroom,” J.M. Grossman, to be submitted to The Physics Teacher.

“High-Order Quantum Resonances Observed in a Periodically Kicked Bose Condensate,” C. Ryu, M. Andersen, A. Vaziri, M. B. d’Arcy, J. M. Grossman, K. Helmerson, and W. D. Phillips, Phys. Rev. Lett. **96**, 160403 (2006).

“Traps for neutral radioactive atoms,” G. D. Sprouse, R. P. Fliiller III, J. S. Grossman, L. A. Orozco, and M. R. Pearson, Nucl. Phys. A **701**, 597c (2002).

“Atomic probes of electromagnetic and weak interactions with trapped radioactive atoms,” G. D. Sprouse, S. Aubin, E. Gomez, J. M. Grossman, L. A. Orozco, M. R. Pearson, and M. True, Eur. Phys. J. A **13**, 239 (2002).

“Francium spectroscopy and a possible measurement of the nuclear anapole moment,” S. Aubin, E. Gomez, J. M. Grossman, L. A. Orozco, M. R. Pearson, G. D. Sprouse, D. P. DeMille, *Laser Spectroscopy: XVth International Conference*, edited by S. Chu and V. Vuletic (World Scientific, Singapore, 2002).

“Energies and hyperfine splittings of the 7D levels of atomic francium,” J. M. Grossman, R. P. Fliiller III, T. E. Mehlstaubler, L. A. Orozco, M. R. Pearson, G. D. Sprouse, and W. Z. Zhao, Phys. Rev. A **62**, 052507 (2000).

“Lifetime measurements of the 7D levels of atomic francium,” J. M. Grossman, R. P. Fliiller III, L. A. Orozco, M. R. Pearson, and G. D. Sprouse, Phys. Rev. A **62**, 062502 (2000).

“Spectroscopy of Francium Isotopes,” J. S. Grossman, L. A. Orozco, M. R. Pearson, and G. D. Sprouse, Phys. Scr. **T86**, 16 (2000).

“Spectroscopy of francium in a magneto-optical trap,” G. D. Sprouse, J. S. Grossman, L. A. Orozco, and M. R. Pearson, Hyp. Int. **127**, 381 (2000).

“Hyperfine anomaly measurements in francium isotopes and the radial distribution of neutrons,” J. S. Grossman, L. A. Orozco, M. R. Pearson, J. E. Simsarian, G. D. Sprouse, and W. Z. Zhao, Phys. Rev. Lett. **83**, 935 (1999).

“Spectroscopy of francium and perspectives of an atomic parity non-conservation measurement,” J. E. Simsarian, S. Aubin, J. S. Grossman, L. A. Orozco, M. R. Pearson, G. D. Sprouse, and W. Z. Zhao in *Parity Violations in Atoms and Polarized Electron Scattering*, edited by Bernard Frois and Marie-Anne Bouchiat (World Scientific, Singapore, 1999), p. 312.

“Hyperfine anomaly measurements in francium isotopes and the radial distribution of neutrons,” J. S. Grossman, L. A. Orozco, J. E. Simsarian, G. D. Sprouse, and W. Z. Zhao, Hyp. Int. **121**, 657 (1999).

External Talks

- “Quantum Computers,” invited colloquium, St. Mary’s College of Maryland, 2008.
- “Trapping an Atom on a Microchip: An Architecture for a Quantum Computer,” invited colloquium, Fordham University, 2006.
- “Implementation of a quantum random walk with a sodium Bose-Einstein condensate,” Division of Atomic, Molecular, and Optical Physics Meeting of the American Physical Society, Tucson, Arizona, 2004.
- “Realization of a quantum random walk with a sodium Bose-Einstein condensate,” International Quantum Electronics Conference, San Francisco, California, 2004.
- “Ultracold atoms go for a quantum random walk,” invited talk, Adelphi University, Garden City, New York, 2004.
- “Ultracold atoms go for a quantum random walk,” invited talk, Ithaca College, Ithaca, New York, 2004.
- “Magnetic Trapping of Atoms,” invited lesson, Penn State Berks-Lehigh Valley College, Reading, Pennsylvania, 2004.
- “Spectroscopy of trapped francium: What can we learn from the least stable natural element?,” invited colloquium, Union College, Schenectady, New York, 2002.
- “Spectroscopy of trapped francium,” invited talk, National Institute of Standards and Technology, Gaithersburg, Maryland, 2002.
- “Lifetimes of the 7D excited states of francium,” Division of Atomic, Molecular, and Optical Physics Meeting of the American Physical Society, Storrs, Connecticut, 2000.
- “Lifetimes of the 7D excited states of francium,” Quantum Electronics and Laser Science Conference, San Francisco, California, 2000.
- “Location of the 7D excited state of francium,” American Physical Society Centennial Meeting, Atlanta, Georgia, 1999.

External Presentations

- “Francium spectroscopy and a proposed direct measurement of the nuclear anapole moment,” S. Aubin, E. Gomez, J. M. Grossman, L. A. Orozco, M. R. Pearson, G. D. Sprouse, Gordon Research Conference on Atomic Physics, Williamstown, Massachusetts, 2001.
- “Francium spectroscopy and the possible direct measurement of the nuclear anapole moment,” S. Aubin, E. Gomez, J. M. Grossman, L. A. Orozco, M. R. Pearson, G. D. Sprouse, International Conference on Laser Spectroscopy, Snowbird, Utah, 2001.
- “New apparatus for magneto-optical trapping of francium,” J. M. Grossman, S. Aubin, E. Gomez, L. A. Orozco, M. E. Pearson, G. D. Sprouse, M. E. True, Quantum Electronics and Laser Science Conference, Baltimore, Maryland, 2001.
- “Magneto-Optical Trap for On-line Fr Spectroscopy,” J. S. Grossman, R. P. Fliller III, C. Friegang, M. Ifferte, L. A. Orozco, M. R. Pearson, B. Peker, J. E. Simsarian, G. D. Sprouse, and W. Z. Zhao, American Physical Society Centennial Meeting, Atlanta, Georgia, 1999.
- “Francium Spectroscopy,” J. S. Grossman, S. Aubin, S. D. Christe, R. P. Fliller III, L. A. Orozco, M. R. Pearson, B. Peker, and G. D. Sprouse, Gordon Research Conference on Atomic Physics, Plymouth, New Hampshire, 1999.
- “Laser Spectroscopy on Trapped Francium,” J. E. Simsarian, J. S. Grossman, L. A. Orozco, M. Pearson, G. D. Sprouse, and W. Z. Zhao, Sixteenth International Conference on Atomic Physics, Windsor, Ontario, 1998.

Student External Presentations

“A Magneto-Optical Trap for an Individual Atom Microchip,” V. Singh, paper presented at Adelphi University Research Conference, April 2007.

“A Magneto-Optical Trap for an Individual Atom Microchip,” V. Singh, paper presented at National Conference on Undergraduate Research, Dominican University of California, April 2007.

“Engineering ‘Atom Microchip’ Trapping Potentials,” F. Ledetsch, paper presented at Adelphi University Research Conference, April 26, 2006.

“Optical Spectroscopy and Laser Locking Electronics,” D. John, poster presented Adelphi University Research Conference, April 26, 2006.

“Positive Operator-Valued Measurements,” M. Sukhanova, paper presented at Adelphi University Research Conference, April 26, 2006.

“Design Considerations for the Vacuum Chamber of a Single-Atom Microchip Magneto-Optical Trap,” V. Singh, poster presented at Adelphi University Research Conference, April 26, 2006.

“Engineering Trapping Potentials for an ‘Atom Microchip’,” T. Palermo and J. Grossman, poster presented at “Einstein’s in the City” student research conference, City College, NY, April 11, 2005.

“Engineering Trapping Potentials for an ‘Atom Microchip’,” T. Palermo, paper presented at Adelphi Undergraduate Research Conference, April 18, 2005.

Professional Memberships

- American Physical Society: Division of Atomic, Molecular, and Optical Physics; Division of Laser Sciences.
- Optical Society of America.
- American Association of Physics Teachers.
- American Association for the Advancement of Science.
- Founding Vice-President of Society of Physics Students Williams College chapter (1995-1996).

Awards and Fellowships

- State University of New York at Stony Brook, Department of Physics & Astronomy, Peter B. Kahn Prize (2000).
- American Physical Society, Division of Laser Sciences travel grant (1999).
- Government Assistance for Areas of National Need Fellowship (1996-1998).

Student Awards

- Vivek Singh, "Best Presentation" and "Best Science Presentation," Adelphi University Research Conference, April 2007.
- Vivek Singh, "Best Thesis" and "Best Science Thesis," Adelphi University Honors College, 2007.

Miscellaneous

- Designed physics-based activities for Science Camp for 8th grade girls (2008).
- Participated in New Physics & Astronomy Teachers Workshop (2004) in College Park, MD, and workshop follow-up session (2005) in Lincoln, NE.
- Judged New York State Science and Engineering Fair (2002), Montgomery County Science Fair (2003), Long Island Junior Science and Humanities Symposia (2005, 2006), Adelphi Undergraduate Research Conference (2005, 2006), and Rohm and Haas Science Fair (2006).
- Featured in cover stories for *Adelphi University Magazine* (2005) and *The Delphian* (2005), as well as in articles in *Adelphi Update for Community College Students, Faculty, and Administrators* (2006) and the *College of Arts & Sciences News* (2006).
- Spoke by invitation at Somerset Elementary School Career Day, Bethesda, Maryland (2004).
- Trained in week-long Coherent 899-21 Ti:Sapph Ring Laser Customer Training Course.
- Participated in Australian National University 13th Physics Summer School on Bose-Einstein Condensation (2000).
- Review manuscripts for professional journals.
- Review grant proposals for National Science Foundation.