JOSHUA GROSSMAN

Associate Professor and Acting Chair, Department of Physics
August 2012

EDUCATION

Stony Brook University, Stony Brook, NY
Doctor of Philosophy in Physics, May 2002
Dissertation: "Spectroscopy of Trapped Francium"
Advisor: Dr. Luis A. Orozco

Williams College, Williamstown, MA
Bachelor of Arts in Physics with Honors, June 1996
Thesis: "Realizing Generalized Quantum Measurements on the Polarization of Photons"
Advisor: Dr. William K. Wootters

EXPERIENCE

Saint Mary's College of Maryland, St. Mary's City, MD
Assistant Professor, Fall 2007 to Summer 2012, full time
Associate Professor, Fall 2012 to present, full time

- Teach courses throughout the undergraduate physics curriculum.
- Developed new course structure for introductory year of physics courses, based on the SCALE-UP model which erases the lecture/lab divide and emphasizes interactive engagement through group problem solving.
- Pioneered the use of personal response systems ("clickers") at St. Mary's College of Maryland. Led Teaching Excellence Workshops on their use (2009, 2010).
- Contributed significantly to the design and funding of an applied physics concentration.
- Lead research on microscopic magnetic surface traps for individual neutral atoms.
- Co-lead research on bichromatic laser forces with Dr. Frank Narducci (Naval Air Warfare Center Aircraft Division (NAWCAD)); collaborate on research on atom interferometers for magnetometry with Dr. Narducci and Dr. Charles Adler (SMCM).
- Lead research on quantum walks and implementation of positive operator-valued measurements (POVMs) on photon polarization states.
- Direct student research in St. Mary's Projects (ten to date) and summer research assistantships (fifteen to date).
- Secured external research grants. Co-PI on instructional and program development grant.
- Served on Core Curriculum Committee (2008-present); served on Physics Faculty Search Committees (2008-2009, 2011-2012, 2012-2013).
- Serve as Hillel faculty advisor (2010-2012).

Acting Department Chair, Summer 2012 to present

- Oversee staffing and scheduling of courses.
- Supervise Physics Lab Coordinator. Provide feedback to faculty and mentor junior faculty.
- Manage department budget, including equipment purchases.
- Coordinate student recruitment campaign with Admissions Office.
- Assist Advancement Office with fundraising campaign for new Applied Physics program.
- Approve Physics transfer equivalencies and certify Physics majors and minors for graduation.

Building Faculty Coordinator (Schaefer Hall), Summer 2012 to present

- Supervise building office staff.
- Act as liaison between building faculty/staff and Facilities and Planning Office. Ensure the building's physical plant and IT issues are resolved.
- Coordinate major HVAC renovation between Facilities and Planning, contractor, and building faculty and staff so as to minimize impact of disruption of instructional, research and office space.

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.

Adelphi University, Garden City, NY
Assistant Professor, Fall 2004 to Spring 2007, full time

- Taught courses throughout the undergraduate curriculum.
- Designed two new courses: How Things Work and Physics Colloquium.
- Organized a new series of Physics Department colloquia.
- Researched microscopic magnetic surface traps for individual atoms and implementation of positive operator-valued measurements (POVMs) on photon polarization states.
- Directed eleven undergraduate research students.
- Initiated new MS program in physics with a concentration in Optics. Chaired Physics Department 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. Phillips' Laser Cooling & Trapping Group, Summer 2002 to Summer 2004, full time

- Studied quantum random walks and quantum chaos with ultracold atoms, photoassociation of Bose-Einstein condensates, and properties of condensates loaded in optical traps.
- Trained graduate and exchange students on research and experimental techniques.

Stony Brook University (formerly State University of NY 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 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 a new apparatus for efficient trapping of francium.

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

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

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

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

GRANTS

(Principal Investigator except where indicated)

Funded at St. Mary's College of Maryland

- Co-Principal investigator (Dr. David Kung, Principal Investigator) on "SMCM STEM Navigators," National Science Foundation grant, August 2012.
- Co-Principal Investigator with Dr. Frank Narducci (NAWCAD) on "High atom number in microsized atom traps," Office of Naval Research grant in April 2012.
- Contributed significantly to "A Transformative Philanthropic Opportunity: Strengthening the College's Connections to the Southern Maryland Community," The Patuxent Partnership investment, March 2012.
- "Large-Number and Individual-Atom Microchip Traps for Sensor Applications and Fundamental Studies," Office of Naval Research Defense University Research Instrumentation Program (DURIP) grant in March 2009.
- Co-Principal Investigator with Dr. Frank Narducci (NAWCAD) on "High atom number in microsized atom traps," Office of Naval Research in December 2008.
- SMCM Grant Writing Workshop award in May 2008.
- SMCM Faculty Development grant in April 2008.
- "Microscopic magnetic surface traps for individual atoms," Research Corporation's Cottrell College Science Award in November 2005 (re-initiated at SMCM in November 2007).
- Guest Researcher contract, Naval Air Warfare Center Aircraft Division in June 2007.

- "Microwave Oven Physics," Bauder Fund grant ($475) from American Association of Physics Teachers in July 2005.
- Adelphi University President's Faculty Development grants in January 2005 and January 2006.

PUBLICATIONS

(Undergraduate co-authors indicated with *)

- "Quantum walks: Interference and connectivity," R. Ding*, D.D. Powell*, and J.M. Grossman, in preparation for submission to Phys. Rev. A.
- "Frames of Reference in the Classroom," J.M. Grossman, The Physics Teacher (in press, Fall 2012).
- "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. Fliller 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. Fliller 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. Fliller 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).

COLLOQUIA, SEMINARS, AND TALKS

(Undergraduate co-authors indicated with *)

- "Optical bichromatic forces for enhancing the number of trapped atoms," J. M. Grossman, A. S. Hammett*, G. P. Hench*, and F. A. Narducci, Division of Atomic, Molecular, and Optical Physics meeting of the American Physical Society, Anaheim, CA, June 2012.
- "Applied Physics and Its Importance to the Navy," F. A. Narducci, C. L. Adler, and J. M. Grossman, invited talk, The Patuxent Partnership Education Forum, Hollywood, MD, November 2011.
- "The March 11 Tohōku Earthquake" in "Triple Disaster: How the Earthquake and Tsunami Caused the Ongoing Nuclear Crisis in Japan," Physics faculty forum, St. Mary's College of Maryland, March 2011.
- "Quantum Walks: Interference, Coherence, and Connectivity," invited colloquium, Dickinson College, Carlyle, PA, February 2011.
- "Quantum Walks: Interference, Coherence, and Connectivity," invited talk, College of William & Mary, Williamsburg, VA, November 2010.
- "Quantum Walks: Interference, Coherence, and Connectivity," invited talk, University of Delaware, Newark, DE, October 2010.
- "An Atom-Interferometric Magnetic Gradiometer," Defense Advanced Research Programs Agency (DARPA) Quantum-Assisted Sensing and Readout workshop, Arlington, VA, June 2010.
- Invited presentation on faculty research to St. Mary's College of Maryland Board of Trustees, December 2009.
- "Quantum-Walk Analogues of Optical Phenomena," D. D. Powell* and J. M. Grossman, Division of Atomic, Molecular, and Optical Physics meeting of the American Physical Society, Charlottesville, VA, May 2009.
- "Quantum Computers," invited colloquium, St. Mary's College of Maryland, February 2008.
- "Trapping an Atom on a Microchip: An Architecture for a Quantum Computer," invited colloquium, Fordham University, Bronx, NY, 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, AZ, 2004.
- "Realization of a quantum random walk with a sodium Bose-Einstein condensate," International Quantum Electronics Conference, San Francisco, CA, 2004.
- "Ultracold atoms go for a quantum random walk," invited talk, Adelphi University, Garden City, NY, 2004.
- "Ultracold atoms go for a quantum random walk," invited talk, Ithaca College, Ithaca, NY, 2004.
- "Magnetic Trapping of Atoms," invited lesson, Penn State Berks-Lehigh Valley College, Reading, PA, 2004.

- "Spectroscopy of trapped francium: What can we learn from the least stable natural element?," invited colloquium, Union College, Schenectady, NY, 2002.
- "Spectroscopy of trapped francium," invited talk, National Institute of Standards and Technology, Gaithersburg, MD, 2002.
- "Lifetimes of the 7D excited states of francium," Division of Atomic, Molecular, and Optical Physics Meeting of the American Physical Society, Storrs, CT, 2000.
- "Lifetimes of the 7D excited states of francium," Quantum Electronics and Laser Science Conference, San Francisco, CA, 2000.
- "Location of the 7D excited state of francium," American Physical Society Centennial Meeting, Atlanta, GA, 1999.

POSTER PRESENTATIONS

(Undergraduate co-authors indicated with *)

- "Bichromatic forces for increasing the number of atoms in miniaturized traps," J. M. Grossman, A. S. Hammett*, R. K. Prasher*, W. T. Malouf*, and F. A. Narducci, Division of Atomic, Molecular, and Optical Physics Meeting of the American Physical Society, Atlanta, GA, June 2011.
- "High atom number using bichromatic forces in microsized atom traps," J. M. Grossman, S. A. DeSavage*, and F. A. Narducci, Division of Atomic, Molecular, and Optical Physics Meeting of the American Physical Society, Houston, TX, May 2010.
- "Bichromatic forces for high atom number in microsized atom traps," J. M. Grossman, C. L. Adler, S. A. DeSavage*, G. R. White*, and F. A. Narducci, Atomic Physics Gordon Research Conference, Tilton, NH, July 2009.
- "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, MA, 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, UT, 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, MD, 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, GA, 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, NH, 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

- "Bichromatic Cooling: Enhanced Laser Forces for Miniaturized Sensor Devices," A. S. Hammett, talk at NAWCAD/SMCM/TPP Educational Partnership Agreement signing ceremony, St. Mary's City, MD, October 2011.
- "Dual Magneto-Optical Trap," R. K. Prasher, talk at NAWCAD/SMCM/TPP Educational Partnership Agreement signing ceremony, St. Mary's City, MD, October 2011.
- S.A. DeSavage, invited talk on student research experiences and career options for prospective students at SMCM Scholars Day, Spring 2010.
- "Quantum-Walk Analogues of Optical Phenomena," D. D. Powell and J. M. Grossman, paper presented at Division of Atomic, Molecular, and Optical Physics Meeting of the American Physical Society, Charlottesville, VA, May 2009.
- D. D. Powell, invited talk on student research experiences and career options for prospective students at SMCM Scholars Day, Spring 2010.
- "A Magneto-Optical Trap for an Individual Atom Microchip," V. Singh and J. M. Grossman, paper presented at National Conference on Undergraduate Research, Dominican University of California, San Rafael, CA, April 2007.
- "Engineering Trapping Potentials for an 'Atom Microchip'," T. Palermo and J. Grossman, poster presented at "Einsteins in the City" student research conference, City College, NY, April 2005.

ST. MARY'S PROJECTS SUPERVISED

Galen Hench	2012-2013	Optimizing Bichromatic Cooling of an Atomic Beam (in progress)
Abigail Taylor	2012-2013	3-D Printing of Manipulables for Physics Instruction (in progress)
Roger Ding	2011-2012	"An Individual-Atom Magneto-Optical Trap on a Microchip"
Adam Hammett	2011-2012	"Bichromatic Cooling of an Atomic Beam"
Rebecca Prasher	2011-2012	"The Physics of Sailing Vessels: The Dove of 1634 and 17th-Century Naval Architecture" (Geneva Boone Award for Outstanding St. Mary's Project)
William Malouf	2010-2011	"Bichromatic Cooling in One Dimension"
Sara DeSavage	2009-2010	"An Atomic Beam for Bichromatic Cooling"
Daniel Powell	2008-2009	"Quantum-Walk Analogues of Optical Phenomena" (Geneva Boone Award for Outstanding St. Mary's Project)
Edward Zuras	2008-2009	"To Build an Interferometer"
Brian Rayburn	2007-2008	"Early Calculations and Construction of an Atom Trap"

AWARDS AND FELLOWSHIPS

- Norton T. Dodge Award for Scholarly and Creative Achievement by a Junior Faculty Member (2010).
- Peter B. Kahn Prize, State University of New York at Stony Brook, Department of Physics & Astronomy (2000).
- Government Assistance for Areas of National Need Fellowship (1996-1998).
- Sigma Xi Associate Member.

STUDENT AWARDS

- Rebecca Prasher, "Geneva Boone Award for Outstanding St. Mary's Project," 2012.
- Sara DeSavage's research was featured in *The SPS Observer* magazine (Spring 2010).
- Daniel Powell, "Geneva Boone Award for Outstanding St. Mary's Project," 2009.
- 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.

PROFESSIONAL MEMBERSHIPS

- American Physical Society (APS): Division of Atomic, Molecular, and Optical Physics (DAMOP); Division of Laser Sciences (DLS).
- Optical Society of America (OSA).
- American Association of Physics Teachers (AAPT).
- Advanced Laboratory Physics Association (ALPhA).
- American Association for the Advancement of Science (AAAS).
- Sigma Pi Sigma.
- Founding Vice-President of Society of Physics Students (SPS) Williams College chapter (1995-1996).

MISCELLANEOUS

- Member of advisory council for Institute of Science, Technology, Engineering, and Mathematics (ISTEM) of College of Southern Maryland (2012).
- Participated in Advanced Laboratory Physics Association (ALPhA) Laboratory Immersion workshop on quantum interference and entanglement at Colgate University (2012).
- Invited participant in the Patuxent Policy Group forum on NASA and the Navy (2011).
- Designed physics-based activities for Science Camp for 8th grade girls (2008).
- Selected to participate in summer-long grant writing workshop at SMCM (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).
- Participated in Australian National University 13th Physics Summer School on Bose-Einstein Condensation (2000).
- Trained in week-long Coherent 899-21 Ti:Sapph Ring Laser Customer Training Course (1998).
- Review manuscripts for professional journals, including Optics Letters and Journal of Physics B: Atomic, Molecular, and Optical Physics.
- Review grant proposals for National Science Foundation (2006-present).