

David A. Branning
Associate Professor of Physics
Trinity College
300 Summit Street
Hartford, CT 06106
phone: (860) 297-4048, fax (860) 297-5358
e-mail: david.branning@trincoll.edu

Education

1994 – 1998	Ph.D. Physics	University of Rochester	Rochester, NY
		Thesis: <i>Optical Tests of Complementarity and Nonlocality</i>	
1992 – 1994	M.A. Physics	University of Rochester	Rochester, NY
1986 – 1990	B.A. Physics	Rice University	Houston, TX

Research and Teaching Experience

2011 – present	Trinity College Associate Professor of Physics	Hartford, CT
2005 -2011	Trinity College Assistant Professor of Physics	Hartford, CT
2003-2005	Rose-Hulman Institute of Technology Assistant Professor of Physics	Terre Haute, IN
2001-2003	University of Illinois at Urbana-Champaign Visiting Assistant Professor	Urbana, IL
1999-2001	National Institute of Standards and Technology NRC Postdoctoral Fellow	Gaithersburg, MD
1996-1997	State University of New York at Geneseo Adjunct Lecturer and Laboratory Instructor	Geneseo, NY
Fall 1996	University of Rochester Adjunct Lecturer	Rochester, NY
1992-1993	University of Rochester Graduate Teaching Assistant	Rochester, NY
1991-1992	Los Alamos National Laboratory Graduate Research Assistant	Los Alamos, NM
1991-1992	Los Alamos Public School District Substitute Teacher, Math and Science	Los Alamos, NM
1990-1991	Rice University Laboratory Teaching Assistant	Houston, TX
Summer 1988	Fermi National Accelerator Laboratory Research Assistant	Batavia, IL

Peer-Reviewed Publications

- “Search for patterns in sequences of single-photon polarization measurements,” **D. Branning**, A. Katcher, Wayne Strange, and Mark P. Silverman, *Journal of the Optical Society of America B* **28**, 1423 (2011).
- “Scalable multi-photon coincidence counting electronics,” **D. Branning**, S. Khanal, Y. H. Shin, B. Clary, and M. Beck, *Review of Scientific Instruments* **82**, 016102 (2011).
- “Testing quantum randomness in single-photon polarization measurements with the NIST test suite,” **D. Branning** and M. Bermudez, *Journal of the Optical Society of America B* **27**, 1594 (2010).
- “Low-cost coincidence-counting electronics for undergraduate quantum optics,” **D. Branning**, S. Bhandari, and M. Beck, *American Journal of Physics* **77**, 667 (2009).
- “Measurement of geometric phase for mixed states using single-photon interferometry,” M. Ericsson, D. Achilles, J. T. Barreiro, **D. Branning**, N. A. Peters, and P. G. Kwiat, *Physical Review Letters* **94**, 050401 (2005).
- “Synthesizing arbitrary two-photon polarization mixed states,” T.-C. Wei, J. B. Altepeter, **D. Branning**, P. M. Goldbart, D. F. V. James, E. Jeffrey, P. G. Kwiat, S. Mukhopadhyay, and N. A. Peters, *Physical Review A* **71**, 032329 (2005).
- “Maximally entangled mixed states: creation and concentration,” N. Peters, J. B. Altepeter, **D. Branning**, E. Jeffrey, T. C. Wei, and P. G. Kwiat, *Physical Review Letters* **92**, 133601 (2004).
- “Demonstration of an all-optical quantum controlled-NOT gate,” J. L. O’Brien, G. J. Pryde, A. G. White, T. C. Ralph, and **D. Branning**, *Nature* **426**, 264 (2003).
- “Ancilla-assisted quantum process tomography,” J. B. Altepeter, **D. Branning**, E. Jeffrey, T. C. Wei, P. G. Kwiat, R. J. Thew, J. L. O’Brien, M. A. Nielsen, and A. G. White, *Physical Review Letters* **90**, 193601 (2003).
- “Tailoring single-photon and multiphoton probabilities of a single-photon on-demand source,” A. L. Migdall, **D. Branning**, and S. Castelletto, *Physical Review A* **66**, 053805 (2002).
- “Simultaneous measurement of group and phase delay between two photons,” **D. Branning**, A. L. Migdall, and A. V. Sergienko, *Physical Review A* **62**, 063808 (2000).
- “Restoring dispersion cancellation for entangled photons produced by ultra-short pulses,” R. Erdmann, **D. Branning**, W. P. Grice, and I. A. Walmsley, *Physical Review A* **62**, 053810 (2000).
- “Interferometric technique for engineering the indistinguishability and entanglement of photon pairs,” **D. Branning**, W. P. Grice, R. Erdmann, and I. A. Walmsley, *Physical Review A* **62**, 013814 (2000).

- "Calculating characteristics of non-collinear phase-matching in uniaxial and biaxial crystals," N. Boeuf, **D. Branning**, I. Chaperot, E. Dauler, S. Guerin, G. Jaeger, A. Muller, and A. Migdall, *Optical Engineering* **39**, 1016 (2000).
- "Engineering the indistinguishability and entanglement of two photons," **D. Branning**, W. P. Grice, R. Erdmann, and I. A. Walmsley, *Physical Review Letters* **83**, 955 (1999).
- "Multiphoton interference effects at a beamsplitter," A. Kuzmich, **D. Branning**, L. Mandel, and I. A. Walmsley, *Journal of Modern Optics* **45**, 2233 (1998).
- "Spectral distinguishability in ultrafast parametric downconversion," W. P. Grice, R. Erdmann, I. A. Walmsley, and **D. Branning**, *Physical Review A* **57**, R2289 (1998).
- "Experimental test of Selleri's photodetection model," A. Garuccio, J. R. Torgerson, C. H. Monken, **D. Branning**, and L. Mandel, *Physical Review A* **53**, 2944 (1996).
- "Generating mutual coherence from incoherence with the help of a phase-conjugate mirror," C. H. Monken, A. Garuccio, **D. Branning**, J. R. Torgerson, F. Narducci, and L. Mandel, *Physical Review A* **53**, 1782 (1996).
- "Violations of locality in polarization-correlation measurements with phase shifters," J. R. Torgerson, **D. Branning**, C. H. Monken, and L. Mandel, *Physical Review A* **51**, 4400 (1995).
- "Experimental demonstration of the violation of local realism without Bell inequalities," J. R. Torgerson, **D. Branning**, C. H. Monken, and L. Mandel, *Physics Letters A* **204**, 323 (1995).
- "A method of demonstrating violation of local realism with a two-photon downconverter without use of Bell inequalities," J. R. Torgerson, **D. Branning**, and L. Mandel, *Applied Physics B* **60**, 267 (1994).
- "Interference and indistinguishability governed by time delays in a low-Q cavity," T. P. Grayson, X. Y. Zou, **D. Branning**, J. R. Torgerson, and L. Mandel, *Physical Review A* **48**, 4793 (1993).

Works in Progress

- "Numerical Procedures for Calculating the Probabilities of Recurrent Runs," A. Katcher and **D. Branning**

Recent Invited Lectures

“Workshop: FPGA Coincidence Module”

AAPT Topical Conference Advanced Laboratories, Philadelphia, PA (July 2012)

“An FPGA-based module for multiphoton coincidence counting”

SPIE Advanced Photon Counting Techniques VI, Baltimore, MD (April 2012)

“Quantum Thought-Experiments with Light”

Physics Seminar, US Air Force Research Lab, Rome, NY (December 2008)

“Frustrated Two-Photon Creation in a Time-Dependent Cavity”

Fifth Conference on Foundations of Probability and Physics, Vaxjo, Sweden (August 2008)

“Experimental Detection of Photons Emitted During Inhibited Spontaneous Emission”

SPIE Optics and Photonics Annual Meeting, San Diego, CA (August 2007)

“Introduction to Bell’s Inequality”

Colloquium, College of William and Mary (November 2007)

Recent Presentations at Professional Meetings

“Time-Dependent Inhibited Spontaneous Emission” **D. Branning**, Y. H. Shin, S. Khanal, and A. L. Migdall, *Conference on Lasers and Electro-Optics*, (2011).

“Search for Patterns in Single-Photon Polarization Sequences” **D. Branning**, A. Katcher, W. Strange, and M. P. Silverman, *ibid*, (2011).

“Scalable Multi-Photon Coincidence-Counting Electronics,” **D. Branning**, S. Khanal, Y. H. Shin, B. Clary, *ibid*, (2011).

“Inhibited Spontaneous Emission in a Time-Dependent Cavity,” **D. Branning**, *Annual Meeting of the Division of Atomic Molecular and Optical Physics, APS*, (2010).

“Testing Quantum Randomness in Single-Photon Polarization Measurements,” **D. Branning** and M. Bermudez, *ibid*, (2010).

“Four-Fold Coincidence Logic for Photon Counting with Universal Control,” **D. Branning**, S. Khanal, and Y. H. Shin, *ibid*, (2010).

“Frustrated Two-Photon Creation in a Time-Dependent Cavity,” **D. Branning**, in *Foundations of Probability and Physics 5*, edited by L. Accardi *et al.*, AIP Conference Proceedings Vol. 1101 (2009), pp. 19 – 28.

“Low-Cost Coincidence-Counting Electronics for Quantum Optics,” S. Bhandari, **D. Branning**, and M. Beck, in *Coherence and Quantum Optics IX*, edited by N. P. Bigelow, J. H. Eberly, and C. R. Stroud, Jr., (OSA, 2008) pp. 332-333.

Courses Taught at Trinity College

PHYS 101	Principles of Physics I
PHYS 131	Mechanics and Heat
PHYS 231	Electricity, Magnetism, and Waves
PHYS 232	Optics and Modern Physics
PHYS 302	Electrodynamics
PHYS 307	Modern Physics
PHYS 315	Contemporary Optics
PHYS 317	Relativity and Fundamental Particles
PHYS 320	Modern Physical Measurements
FYSM 229	Physics in Science Fiction

Service to Trinity College

2015-present	Member, Curriculum Committee
2006-present	Faculty Advisor, Society of Physics Students (SPS), Trinity Chapter
2014-2015	Member, Writing Center Faculty Search Committee
2013-2014	Member, First-Year Seminars Committee
2012-2014	Member, House System Implementation Committee
2006-2014	Faculty Advisor, Trinity Comic Book Reading Club
2009-2011	Member, Information Technology in Education Committee
2009-2011	Member, Summer Program Planning Committee

Service to the Hartford Community

2008-2012	Hosted annual physics fair project competition for middle school students
2007-2011	Organized physics outreach field trips to Hartford Magnet Middle School
2006-2013	“Cosmic Cinema: Films about Science, Technology, and Imagination,” a weekly film series for Trinity students, faculty, and Hartford residents.

Professional Memberships

American Physical Society
Optical Society of America

Honors, Awards, and Grants

- 2011-2012 **Society of Physics Students**
Two-time national finalist for Outstanding SPS Chapter Advisor
- 2009-2011 **National Science Foundation**
\$125,000 RUI: Time-dependent inhibited spontaneous emission
- 2010-2011 **NASA Connecticut Space Grant College Consortium**
\$6,000: Multi-photon coincidence counting with a field-programmable gate array
- 2009-2010 **NASA Connecticut Space Grant College Consortium**
\$20,000: Four-fold coincidence logic for photon counting with universal control
- 2008-2009 **NASA Connecticut Space Grant College Consortium**
\$6,000: USB Interface for photon logic control
- 2007-2008 **NASA Connecticut Space Grant College Consortium**
\$6,000: A new circuit board for counting simultaneous pairs of photons
- 1999-2001 **National Research Council**
Postdoctoral Fellowship
- 1992-1994 **U.S. Department of Education**
Graduate Assistance in Areas of National Need Fellowship
- 1992-1993 **University of Rochester Department of Physics**
Graduate Student Teaching Award
- 1987-1988 **Rice University**
Max Roy Scholarship
- 1986-1987 **Rice University**
National Merit Scholarship