CURRICULUM VITAE

JAMES D. FRANSON

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EDUCATION

Ph.D.	1977	California Institute of Technology, physics
B.S.	1970	Purdue University, physics

Experience in Higher Education

2023 - present	UMBC, professor emeritus, physics
2006 – 2023	UMBC, professor, physics
2002 – 2005	Johns Hopkins U., research professor, ECE dept.
2000 – 2006	UMBC, adjunct professor, physics
1984 – 2006	Johns Hopkins APL, principal staff, physics
1978 – 1984	Johns Hopkins APL, senior staff, physics
1977 – 1978	California Institute of Technology, post-doc, physics

Experience in Other than Higher Education

1970 – 1972	U.S. Army Corps of Engineers, reactor engineering

Honors Received

2018 -2021	Presidential Research Professor, UMBC
2010	Fellow, American Physical Society
2000	Fellow, Optical Society of America
1999	Excellence in teaching award, Johns Hopkins APL
1992 , 1999	R.W. Hart Prize for R&D, Johns Hopkins APL
1990 – 2011	Outstanding Publication Awards (6), Johns Hopkins APL
1989	Stuart S. Janney Fellow, Johns Hopkins APL
1977	Thomas J. Watson Fellow, California Institute of Tech.
1972 – 1975	National Science Foundation Fellow, Caltech
1970	R.W. King physics undergraduate award, Purdue U.

Research Support

2021 – 2023	$ 450 K, NSF Co-Pi
2018 – 2023	$ 850 K, MPO PI
2019 – 2019	$ 79 K, ARL PI
2018 – 2022	$ 310 K, NSF PI
2016 - 2017	$ 250 K, MPO PI
2018 – 2021	$ 210 K, ONR Co-PI
2014 – 2019	$ 556 K, NSF Co-PI
2012 – 2015	$ 4,100 K, DARPA, PI
2010 - 2012	$ 255 K, DARPA, PI
2009 - 2011	$ 446 K, DARPA, PI
2007 – 2010	$ 300 K, National Science Foundation, Co-Pi
2004 – 2009	$ 1,260 K, Army Research Office, PI
2007 – 2008	$ 50 K, Johns Hopkins APL, PI
1980 – 2006	Earlier funding at Johns Hopkins APL is not available

Ph.D. Students

Hari Lamsal, 2020, member
Ian Nodurft, 2020, chair
Richard Brewster, 2019, chair
Marcu, Diana, 2017, member
Jones, Dan, 2016, member
Calderon Vargas, Fernando, 2016, member
Kirby, Brian, 2015, chair
Coley, Joel, 2015, member
Lai, Meimei, 2013 member
Liang, Junlin, 2012 member
Karmakar, Sanjit, 2012 member
Hao You, 2010, chair
Vincenzo Tamma, 2010, member
Scott Hendrickson, 2008, chair
Bryan Jacobs, 2003, chair

Master's Students

DeSavage, Sara, chair
Michael Herrera, 2008, member
Christopher Roettgen, 2008, chair

Undergraduate Students

Eftimiaedes, Alexander

PUBLICATIONS, PRESENTATIONS, AND CREATIVE ACHIEVEMENTS

Publications

Peer-Reviewed Works

Articles

1. C.J. Evans, C.M. Nunn, S.W.L. Cheng, J.D. Franson, and T.P. Pittman, "Experimental storage of photonic polarization entanglement in a broadband loop-based quantum memory", Phys. Rev. A **108**, L050601 (2023).

2. C.M. Nunn, J.D. Franson, and T.B. Pittman, "Modifying quantum optical states by zero-photon subtraction", Phys. Rev. A **105**, 033702 (2022).

3. J.D. Franson, "Experimental test of the third quantization of the electromagnetic field", Phys. Rev. A **106**, 013713 (2022).

4. S.U. Shringarpure, C.M. Nunn, T.B. Pittman, and J.D. Franson, "Coherence of Quantum States after Noiseless Attenuation", Phys. Rev. A **105**, 013704 (2022).

5. J.D. Franson, "Third Quantization of the Electromagnetic Field", Phys. Rev. A **104**, 063702 (2021).

6. S.U. Shringarpure and J.D. Franson, "Proposal for a Destructive Controlled Phase Gate using Linear Optics", Scientific Reports **11**, 22067 (2021).

7. C.M. Nunn, J.D. Franson, and T.B. Pittman, "Heralding on the Detection of Zero Photons", Phys. Rev. A **104**, 033717 (2021).

8. S.U. Shringarpure and J.D. Franson, "Generating entangled Schrodinger cat states using a number state and a beam splitter", Phys. Rev. A **102**, 023719 (2020).

9. I.C. Nodurft, S.U. Shringarpure, B.T. Kirby, T.B. Pittman, and J.D. Franson, "Nonlocal Dispersion Cancellation for Three or More Photons", Phys. Rev. A **102**, 013713 (2020).

10. J.D. Franson and M.M. Wilde, "Jonathan Patrick Dowling in Memoriam", Nature Photonics **14**, 525 (2020).

11. H.P. Lamsal, J.D. Franson, and T.B. Pittman, "Maximizing optical production of metastable xenon", Optics Express **28**, 24079 (2020).

12. J.D. Franson, "Velocity-dependent optical forces and Maxwell's demon", Nature Scientific Reports **9**, 13798 (2019).

13. S.U. Shringarpure and J.D. Franson, "Generating photon-added states without adding a photon", Phys. Rev. A **100**, 043802 (2019).

14. I.C. Nodurft, R.A. Brewster, T.B. Pittman, and J.D. Franson, "Optical attenuation without absorption", Phys. Rev. A **100**, 013850 (2019).

15. H.P. Lamsal, J.D. Franson, and T.B. Pittman, "Transmission characteristics of optical nanofibers in metastable xenon", Applied Optics **58**, 6470 (2019).

16. R.A. Brewster. B.T. Kirby, J.D. Franson, and M. Brodsky, "Compensation of polarization-dependent loss using noiseless amplification and attenuation", Phys. Rev. A **100**, 033811 (2019).

17. R.A. Brewster. T.B. Pittman, and J.D. Franson, "Reduced decoherence using squeezing, amplification, and antisqueezing, Physical Review A **98**, 033818 (2018).

18. J.D. Franson and R.A. Brewster, "Effects of Entanglement in an Ideal Optical Amplifier", Physics Letters A **382**, 887 (2018).

19. R.A. Brewster and J. D. Franson, "Generalized Delta Functions and their Use in Quantum Optics", J. of Mathematical Physics **59**, 012102 (2018).

20. R.A. Brewster, I.C. Nodurft, T.B. Pittman, and J.D. Franson, "Noiseless Attenuation using an Optical Parametric Amplifier", Phys. Rev. A **96**, 042307 (2017).

21. J.D. Franson, "Quantum-Mechanical Twin Paradox", New Journal of Physics **18**, 101001 (2016).

22. J.D. Franson, "Classical Simulation of Quantum Systems?", Physics **9**, 66 (2016).

23. G.T. Hickman, J.D. Franson, and T.B. Pittman, "Optically Enhanced Production of Metastable Xenon", Optics Lett. **41**, 4372 (2016).

24. D.E. Jones, G.T. Hickman, J.D. Franson, and T.B. Pittman, "Nanofiber-Segment Ring Resonator", Optics Letters **16**, 3683 (2016).

25. D.E. Jones, J.D. Franson, and T.B. Pittman, "Ladder-Type Electromagnetically Induced Transparency using Nanofiber-Guided Light in a Warm Atomic Vapor", Physical Review A **92**, 043806 (2015).

26. J.D. Franson and B.T. Kirby, "Origin of Quantum Noise and Decoherence in Distributed Amplifiers", Physical Review A **92**, 053825 (2015).

27. G.T. Hickman, T.B. Pittman, and J.D. Franson, "Low-Power Cross-Phase Modulation in a Metastable Xenon-Filled Cavity for Quantum-Information Applications", Physical Review A **92**, 053808 (2015).

28. B.T. Kirby, G.T. Hickman, T.B. Pittman, and J.D. Franson, "Feasibility of Single-Photon Cross-Phase Modulation using Metastable Xenon in a High Finesse Cavity,

Optics Communications **337**, 57 (2015).

29. G.T. Hickman, T.B. Pittman, and J.D. Franson, "Saturated Absorption at Nanowatt Power Levels using Metastable Xenon in a High-Finesse Optical Cavity", Optics Express 22, 1-6 (2014).

30. D.E. Jones, J.D. Franson, and T.B. Pittman, "Saturation of Atomic Transitions using Subwavelength Diameter Tapered Optical Fibers in Rubidium Vapor", Journal of the Optical Society of America B **31**, 1997-2001 (2014).

31. J.D. Franson, "Apparent Correction to the Speed of Light in a Gravitational Potential", New Journal of Physics **16**, 065008 (2014).

32. B.T. Kirby and J.D. Franson, "Macroscopic State Interferometry over Large Distances using State Discrimination", Physical Review A **89**, 033861 (2014).

33. T.B. Pittman, D.E. Jones, and J.D. Franson, "Ultralow-power Nonlinear Optics using Tapered Optical Fibers in Metastable Xenon", Physical Review A **88**,053804 (2013).

34. M. Lai, J.D. Franson, and T.B.Pittman, "Transmission Degradation and Preservation for Tapered Optical Fibers in Rubidium Vapor", Applied Optics **52**, 2595 (2013).

35. J.D. Franson, "Beating Classical Computing Without a Quantum Computer", Science **339**, 767 (2013).

36. B.T. Kirby and J.D. Franson, "Nonlocal Interferometry using Macroscopic Coherent States and Weak Nonlinearities", Physical Review A **87**, 053822 (2013).

37. S.M. Hendrickson, C.N. Weiler, R.M. Camacho, P.T. Rakich, A.I. Young, M.J. Shaw, T.B. Pittman, J.D. Franson, and B.C. Jacobs, "All-optical switching Demonstration Using Two-photon Absorption and the Zeno Effect", Physical Review A **87**, 023808 (2013).

38. J.D. Franson, "A Topological Route to Error Correction", Nature **482**, 478 (2012).

39. J.D. Franson, "Mathematical Constraint on Functions with Continuous Second Partial Derivatives", Journal of Physics A: Mathematical and Theoretical **45**, 045202 (2012).

40. J. Liang, J.D. Franson, and T.B. Pittman, "Time-bin-entangled Photon Holes", Physical Review A **86**, 053831 (2012).

41. H. You and J.D. Franson, "Theoretical Comparison of Quantum Zeno Gates and Logic Gates Based on the Cross-Kerr Nonlinearity", Quantum Information Processing **11**, 1627 (2012).

42. J.D. Franson, "Sensitivity of Entangled Photon Holes to Loss and Amplification",

Physical Review A **84**, 043831 (2011).

43. J.D. Franson, "Entanglement from Longitudinal and Scalar Photons", Physical Review A **84**, 033809 (2011).

44. J.D. Franson, "Pairs Rule Quantum Interference", Science **329**, 396 (2010).

45. S.M. Hendrickson, M.M. Lai, T.B. Pittman, and J.D. Franson, "Observation of two-photon absorption at low power levels using tapered optical fibers in rubidium vapor", Physical Review Letters **105**, 173602 (2010).

46. J.D. Franson, "Lack of dispersion cancellation with classical phase-sensitive light", Physical Review A **81**, 023825 (2010).

47. J.D. Franson, "Nonclassical nature of dispersion cancellation and nonlocal interferometry", Physical Review A **80**, 032119 (2009).

48. H. You, S.M. Hendrickson, and J.D. Franson, "Enhanced two-photon absorption using entangled states and small mode volumes", Physical Review A **80**, 043823 (2009).

49. B.C. Jacobs and J.D. Franson, "All-optical switching using the quantum Zeno effect and two-photon absorption", Phys. Rev. A **79**, 063830 (2009).

50. S.M. Hendrickson, T.B. Pittman, and J.D. Franson, "Nonlinear transmission through a tapered fiber in rubidium vapor", Journal of the Optical Society of America B **26**, 267 (2009).

51. Hao You, S.M. Hendrickson, and J.D. Franson, "Analysis of Enhanced Two-Photon Absorption in Tapered Optical Fibers", Phys. Rev. A **78**, 053803 (2008).

52. J.D. Franson, "Generation of Entanglement Outside of the Light Cone", Journal of Modern Optics **55**, 2117-2140 (2008).

53. T.B. Pittman, J.D. Franson, and B.C. Jacobs, "Investigation of a Single-Photon Source based on Quantum Interference", New Journal of Physics **9**, 195 (2007).

54. S.M. Hendrickson, T.B. Pittman, and J.D. Franson, "Microcavities Using Holey Fibers", Journal of Lightwave Technology **25**, 3068 (2007).

55. J.D. Franson, B.C. Jacobs, and T.B. Pittman, "Zeno Logic Gates Using Microcavities", Journal of the Optical Society of America B **24**, 209 (2007).

56. T.B. Pittman and J.D. Franson, "Generation of Entangled Photon Holes using Quantum Interference", Phys. Rev. A **74**, 041801 (R) (2006).

57. B.C. Jacobs, T.B. Pittman, and J.D. Franson, "Single Photon Source Using Laser Pulses

and Two-photon Absorption", Phys. Rev. A **74**, 010303 (R) (2006).

58. J.D. Franson and S.M. Hendrickson, "Optical Transparency Using Interference Between Two Modes of a Cavity", Phys. Rev. A 7**4**, 053817 (2006).

59. J.D. Franson, "Entangled Photon Holes", Phys. Rev. Lett. **96**, 090402 (2006).

60. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Heralding Single Photons from Pulsed Parametric Down-Conversion", Optics Communications **246**, 545-550 (2005).

61. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Experimental Demonstration of a Quantum Circuit using Linear Optics Gates", Physical Review A **71**, 032307 (2005).

62. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Demonstration of quantum error correction using linear optics", Phys. Rev. A **71**, 052332 (2005).

63. J.P. Dowling, J.D. Franson, H. Lee, and G.J. Milburn, "Towards Scalable Linear-Optical Quantum Computers", Quantum Information Processing **3**, 205 (2004).

64. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Heralding single photons from pulsed parametric down-conversion", Optics Communications **246**, 545 (2004).

65. D. Achilles, C. Silberhorn, C. Śliwa, K. Banaszek, I.A. Walmsley, M.J. Fitch, B.C. Jacobs, T.B. Pittman, and J.D. Franson, "Photon-number-resolving detection using time-multiplexing", Journal of Modern Optics **51**, 1499 (2004).

66. J.D. Franson, B.C. Jacobs, and T.B. Pittman, "Quantum Computing using Single Photons and the Zeno Effect", Phys. Rev. A **70**, 062302 (2004).

67. J.D. Franson, "Photon Exchange Interactions and Quantum Information Processing", Phys. Rev. A **70**, 054301 (2004).

68. J.D. Franson, M.M. Donegan, and B.C. Jacobs, "Generation of Entangled Ancilla States for use in Linear Optics Quantum Computing", Physical Review A **69**, 052328 (2004).

69. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Probabilistic Quantum Encoder for Single-Photon Qubits", Physical Review A **69**, 042306 (2004).

70. M.J. Fitch, B.C. Jacobs, T.B. Pittman, and J.D. Franson, "Photon number resolution using time-multiplexed single-photon detectors", Physical Review A **68**, 043814 (2003).

71. T.B. Pittman, M.M. Donegan, M.J. Fitch, B.C. Jacobs, J.D. Franson, P. Kok, H. Lee, and J.P. Dowling, "Heralded Two-Photon Entanglement from Probabilistic Quantum Logic Operations on Multiple Parametric Down-Conversion Sources", IEEE Journal

of Selected Topics in Quantum Electronics **9**, 1478 (2003).

72. T.B. Pittman, M.J. Fitch, B.C. Jacobs, and J.D. Franson, "Experimental Controlled-NOT Logic Gate for Single Photons in the Coincidence Basis", Physical Review A **68**, 032316 (2003).

73. T.B. Pittman and J.D. Franson, "Violation of Bell's Inequality with Photons from Independent Sources", Physical Review Letters **90**, 240401-1 to 240401-4 (2003).

74. J.D. Franson, M.M. Donegan, M.J. Fitch, B.C. Jacobs, and T.B. Pittman, "Experimental Progress in Linear Optics Quantum Computing", Quantum Information and Control **3**, 553-562 (2003).

75. T.B. Pittman and J.D. Franson, "Cyclic Quantum Memory for Photonic Qubits, Physical Review A **66**, 062302-1 to 062302-4 (2002).

76. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Single Photons on Pseudo-Demand from Stored Parametric Down-Conversion", Physical Review A **66**, 042303-1 to 042303-7 (2002).

77. B.C. Jacobs, T.B. Pittman, and J.D. Franson, "Quantum Relays and Noise Suppression Using Linear Optics", Physical Review A **66**, 052307-1 to 052307-6 (2002).

78. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Demonstration of Feed-Forward Control for Linear Optics Quantum Computation", Physical Review A **66**, 052305-1 to 052305-7 (2002).

79. J.D. Franson, M.M. Donegan, M. J. Fitch, B.C. Jacobs, and T. B. Pittman, "High-Fidelity Quantum Logic Operations Using Linear Optical Elements", Physical Review Letters **89**, 137901-1 to 137901-4 (2002).

80. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Demonstration of Nondeterministic Quantum Logic Operations Using Linear Optical Elements", Physical Review Letters **88**, 257902-1 to 257902-4 (2002).

81. M.J. Fitch and J.D. Franson, "Dispersion Cancellation and Non-Classical Noise Reduction for Large-Photon-Number States", Physical Review A **65**, 053809-1 to 053809-7 (2002).

82. J.D. Franson and M.M. Donegan, "Perturbation Theory for Quantum-Mechanical Observables", Physical Review A **65**, 052107-1 to 052107-8 (2002).

83. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Probabilistic Quantum Logic Operations using Polarizing Beam Splitters", Physical Review A **64**, 062311-1 to 062311-9 (2001).

84. J.D. Franson, "Reply to a Review of Photon-Exchange Interactions by Opatrny and

Kurizki", Fortschritte der Physik **48**, 1133-8 (2000).

85. J.D. Franson, "Inconsistency of Local Realistic Descriptions of Two-Photon Interferometer Experiments", Physical Review A **61**, 12105-1 to 12105-5 (1999).

86. J.P. Dowling, C.P. Williams, and J.D. Franson, "Maxwell Duality, Lorentz Invariance, and Topological Phase", Physical Review Letters **83**, 2486-2489 (1999).

87. J.D. Franson and T.B. Pittman, "Quantum Logic Operations based on Photon-Exchange Interactions", Physical Review A **60**, 917-936 (1999).

88. J.D. Franson, "Experimental Observation of the Splitting of Single Photons by a Beam Splitter", Physical Review A **56**, 1800-1805 (1997).

89. J.D. Franson, "Cooperative Enhancement of Optical Quantum Gates", Physical Review Letters **78**, 3852-3855 (1997).

90. J.D. Franson, "Change and Uncertainty in Quantum Systems", Physical Review A **54**, 3808-3812 (1996).

91. B.C. Jacobs and J.D. Franson, "Quantum Cryptography in Free Space", Optics Letters **21**, 1854-1856 (1996).

92. J.D. Franson, "Coherent Splitting of Single Photons by an Ideal Beam Splitter", Physical Review A **53**, 3756-3760 (1996).

93. J.D. Franson and B.C. Jacobs, "Operational System for Quantum Cryptography", Electronics Letters **31**, 232-234 (1995).

94. J.D. Franson, "Dynamic Phase of the Electromagnetic Field", Phys. Rev. A **51**, 2371-2380 (1995).

95. J.D. Franson and H. Ilves, "Quantum Cryptography using Polarization Feedback", Journal of Modern Optics **41**, 2391-2396 (1994).

96. J.D. Franson and H. Ilves, "Quantum Cryptography Using Optical Fibers", Applied Optics **33**, 2949-2954 (1994).

97. J.D. Franson, "Nonlocal Reduction of the Wave Function by Quantum Phase Measurements", Phys. Rev. A **49**, 3221-3227 (1994).

98. J.D. Franson, "Nonlocal Interferometry with High-Intensity Fields", Phys. Rev. A **48**, 4610-4616 (1993).

99. J.D. Franson and B.C. Jacobs, "Null Result for Enhanced Neutrino Scattering in Crystals", Phys. Rev. A **46**, 2235-2239 (1992).

100. J.D. Franson, "Nonlocal Cancellation of Dispersion", Phys. Rev. A **45**, 3126-3132 (1992).

101. J.D. Franson, "Photon Entanglement in Macroscopic Systems", Phys. Rev. A **45**, 8074-8078 (1992).

102. J.D. Franson, "Two-Photon Interferometry over Large Distances", Phys. Rev. A **44**, 4552-4555 (1991).

103. J.D. Franson, "Violations of a Simple Inequality for Classical Fields", Phys. Rev. Lett. **67**, 290-293 (1991).

104. J.D. Franson, "Coherent n^2 Scattering in Periodic Lattices", Phys. Rev. Lett. **65**, 671-674 (1990).

105. J.D. Franson, "Bell Inequality for Position and Time", Phys. Rev. Lett. **62**, 2205-2208 (1989).

106. J.D. Franson and K.A. Potocki, "Single-Photon Interference Over Large Distances", Phys. Rev. A **37**, 2511-2515 (1988).

107. J.D. Franson, "Bell's Theorem and Delayed Determinism", Phys. Rev. D **31**, 2529-2532 (1985).

108. J.D. Franson, "Extension of the Einstein-Podolsky-Rosen Paradox and Bell's Theorem", Phys. Rev. D **26**, 787-800 (1982).

109. J.D. Franson, G. S. Mitchard, and J. E. Mercereau, "Thermal Switching Times of Superconducting Weak Links", Appl. Phys. Lett. **33**, 98-100 (1978).

110. J.D. Franson and J. E. Mercereau, "Microwave Impedance of Superconducting Weak Links", J. Appl. Phys. **47**, 3261-3265 (1976).

Non-Peer-Reviewed Works

Conference Proceedings

1. T.B. Pittman and J.D. Franson, “Photonic Quantum Computing using Forced Fermion-Like Behavior”, Proceedings of the Tenth International Conference on Quantum Communication, Measurement and Computation, Brisbane, Australia, July 19-23, 2010.

2. B.C. Jacobs and J.D. Franson, “Optical Switches and Memories Using the Zeno Effect and Two-Photon Absorption”, to appear in the proceedings of the Advances in Optical

Sciences: OSA Optics and Photonics Congress, Honolulu, Hawaii, July 12-17, 2009.

3. J.D. Franson, "Generation of Entanglement Outside of the Light Cone", to appear in the proceedings of the 9th International Conference on Quantum Communication, Measurement and Computing, Calgary, Canada, Aug. 19-24, 2008. (Invited)

4. J.D. Franson, "Nonlocal Interferometry: Beyond Bell's Inequality", Proceedings of the 9th Rochester Conference on Coherence and Quantum Optics, Rochester, NY, June 11, 2007, (N.P. Bigelow, J.H. Eberly, and C.R. Stroud, Jr., eds., American Institute of Physics, 2008). (Invited)

5. J.D. Franson and T.B. Pittman, "Entangled Photon Holes", Proceedings of the 8th International Conference on Quantum Communications, Measurement, and Control, Tsukuba, Japan, 28 Nov. to 3 Dec., 2006. (Invited).

6. T.B. Pittman and J.D. Franson, "Generation of Entangled Photon Holes Using Quantum Interference", Proceedings of the OSA Annual Meeting, Rochester, N.Y., Oct. 8-12, 2006.

7. B.C. Jacobs, S. Hendrickson, M. Dennis, and J. Franson, "Quantum Cryptography at 830 nm in Standard Telecommunications Fiber", *Quantum Information and Computation IV*, Proc. of SPIE 6244OH, 0277 (2006).

8. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Simple Circuit of Linear Optics Logic Gates", proceedings of the SPIE conference, Denver, CO, August 5, 2004.

9. T.B. Pittman, M.J. Fitch, B.C. Jacobs, and J.D. Franson, "Periodic Single-Photon Source and Quantum Memory", Proceedings of the SPIE Annual Meeting, San Diego, CA, 3-8 August, 2003.

10. T.B. Pittman and J.D. Franson, "Experimental Work Towards Linear Optics Quantum Computing: Three-Photon Interference Experiments", Proceedings of the 8th International Conference on Squeezed States and Uncertainty Relations, Puebla, Mexico, 9-13 June, 2003. (Invited).

11. J.D. Franson, M.M. Donegan, M.J. Fitch, B.C. Jacobs, and T.B. Pittman, "Progress in Linear Optics Quantum Computing", Proceedings of the 6th International Conference on Quantum Communication, Measurement, and Computing, J.H. Shapiro and O. Hirota, Eds., Boston, MA, 22-26 July, 2002 (Rinton Press).

12. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Demonstration of non-deterministic quantum logic operations using linear optical elements", Proceedings of the Quantum Electronics and Laser Science Conference, Long Beach, CA, 19-24 May, 2002 (Optical Society of America, Washington).

13. J.D. Franson and M.J. Fitch, "Dispersion cancellation and non-classical noise reduction for large photon-number states", Proceedings of the Quantum Electronics and Laser

Science Conference, Long Beach, CA, 19-24 May, 2002 (Optical Society of America, Washington).

14. J.D. Franson, B.C. Jacobs, and T.B. Pittman, "Experimental Demonstration of Quantum Logic Operations Using Linear Optical Elements", Proceedings of the IV Adriatico Research Conference on Quantum Interferometry, Trieste, Italy, 11-15 March, 2002 (Fortschr. Phys. **51**, 369-378, 2003). (Invited)

15. J.D. Franson, "Quantum Cryptography Systems", Proceedings of the IEEE 2000 Sarnoff Symposium, The College of New Jersey, 22 March, 2000 (Invited)

16. J.D. Franson and T.B. Pittman, "Nonlinear Optics at the Two-Photon Level", Proceedings of the International Quantum Electronics Conference, 1998.

17. J.D. Franson and T.B. Pittman, "An Optical Approach to Quantum Computing, Proceedings of the 1st NASA International Conference on Quantum Computing and Quantum Communications, Palm Springs, CA, 19 February, 1998 (Springer, Berlin).

18. J.D. Franson and T.B. Pittman, "Nonlocality in Quantum Computing", Proceedings of the Fundamental Problems in Quantum Theory Conference, Baltimore, MD, 5 August, 1997 (Fortschritte der Physik **46**, 697, 1998). (Invited)

19. J. D. Franson and B.C. Jacobs, "Global Systems for Quantum Cryptography", Proceedings of the International Quantum Electronics Conference, Sydney, Australia, 19 July, 1996.

20. J.D. Franson, "Splitting of Single Photons by an Ideal Beam Splitter", Proceedings of the International Quantum Electronics Conference, Sydney, Australia, 16 July, 1996.

21. J.D. Franson, "A New Source of Entangled Photons", Proceedings of the Adriatico Conference on Quantum Interferometry, Trieste, Italy, 5 March 1995 (VCH Publishing, N.Y.). (Invited)

22. J.D. Franson, "Coherent Splitting of Single Photons by an Ideal Beam Splitter", Proceedings of the Seventh Rochester Conference on Coherence and Quantum Optics, 7-10 June, 1995 (Plenum, N.Y.).

23. J.D. Franson, "Entanglement of Virtual Photons", Proceedings of the Conference on Fundamental Problems in Quantum Theory, Annals of the New York Academy of Science **755**, 654-663, 18-22 June, 1994. (Invited)

24. J.D. Franson, "Quantum Phase Uncertainties and the Classical Limit", Proceedings of the International Conference on Squeezed States, Baltimore, MD, 11 August 1993. (Invited)

25. J.D. Franson, "Realizations of the EPR Paradox using High Intensity Fields",

Proceedings of the International Conference on Quantum Interferometry, Trieste, Italy, 4 March 1993 (World Scientific). (Invited)

26. J.D. Franson, "Is there a Correspondence Principle in Quantum Optics?", Proceedings of the Conference on Quantum Control and Measurement, Tokyo, Japan, 28-29 August, 1992 (North-Holland). (Invited)

27. J.D. Franson, "Nonlocal Interferometry with High Intensity Fields", Proceedings of the XVIII International Quantum Electronics Conference, Vienna, Austria, 15 June 1992.

28. J.D. Franson, "Inequalities in Two-Photon Interferometry", Proceedings of the Santa Fe Meeting on the Foundations of Quantum Mechanics, Santa Fe, NM, 27-31 May, 1991 (World Scientific). (Invited).

29. J.D. Franson, "Violations of a New Inequality for Classical Fields", Proceedings of the Workshop on Squeezed States and Uncertainty Relations, College Park, MD, 28-30 March, 1991. (Invited)

30. J.D. Franson, "Bell's Theorem for Position and Time", Proceedings of the 3rd International Symposium on the Foundations of Quantum Mechanics, Tokyo, Japan, 27-31 August, 1989 (Physical Society of Japan). (Invited)

31. J.D. Franson, "A New Test of Bell's Inequality Using Optical Interference", in Coherence and Quantum Optics VI, Proceedings of the sixth Rochester Conference on Coherence and Quantum Optics, Rochester, N.Y. 26 June, 1989 (J. H. Eberly, L. Mandel, and E. Wolf, eds., Plenum Press, N.Y.).

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2. J.D. Franson, "Quantum Cryptography", in *Optical and Digital Techniques for Information Security*, B. Javidi, ed. (Springer), 2005.

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1. J.D. Franson and B.C. Jacobs, "Quantum Computing", Johns Hopkins Technical Digest **18**, 188-192 (1997).

2. J.D. Franson, "Recent Developments in Quantum Optics", Johns Hopkins Technical Digest **16**, 324-332 (1995).

3. J.D. Franson and K.A. Potocki, "An Experimental Test of the Quantum Theory", Johns Hopkins APL Technical Digest **5**, 305-308 (1984).

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Presentations

Conference/Poster Presentations (Non-Juried/Refereed)

1. S.U. Shringarpure and J.D. Franson, “Clock Synchronization using the Quantum Zeno Effect”, FIO Conference, Rochester, N.Y. (online), Oct. 18, 2021.

2. C.M. Nunn, J.D. Franson, and T.B. Pittman, “Experimental Noiseless Attenuation with Heralding on Zero Photons”, CLEO Conference, San Diego, CA (online), May 11, 2021.

3. S.U. Shringarpure, C. M. Nunn, T.B. Pittman, and J.D. Franson, “Noiseless Attenuation of Quantum States”, CLEO Conference, San Diego, CA (online), May 11, 2021.

4. S.U. Shringarpure and J.D. Franson, “Generation of entangled cats from photon number states”, FIO LS 2020 Conference, Washington, DC, Sept. 14, 2020 (virtual).

5. H. Lamsal, J.D. Franson, and T.B. Pittman, “Optical pumping in xenon atoms”, FIO LS 2020 Conference, Washington, DC, Sept. 15, 2020 (virtual).

6. C. Nunn, J.D. Franson, and T.B. Pittman, “Heralded Noiseless Attenuation for Quantum Optical Communication”, FIO LS 2020 Conference, Washington, DC, Sept. 15, 2020 (virtual).

7. J.D. Franson and S.U. Shringarpure, “Entanglement Distribution Using a Number State and a Beam Splitter”, CLEO Conference, San Jose, Ca, May 14, 2020 (virtual).

8. S.U. Shringarpure and J.D. Franson, “Generating Photon-Added States Without Adding a Photon”, March meeting of the American Physical Society, Mar. 6, 2020 (virtual).

9. I.C. Nodurft and J.D. Franson, “Optical Attenuation Without Absorption”, March meeting of the American Physical Society, Mar. 6, 2020 (virtual).

10. S.U. Shringarpure and J.D. Franson, “Generating Photon-Added States Without Adding a Photon”, Frontiers in Optical Science Conference, Washington, D.C., May, 2019.

11. I.C. Nodurft, R.A. Brewster, and J.D. Franson, “Optical Attenuation Without Absorption”, Frontiers in Optical Science Conference, Washington, D.C., May, 2019.

12. J.D. Franson, “Decoherence and the Heisenberg Picture”, Quantum Coherence, Control, and Computing Workshop, Hoboken, N.J. Oct. 11, 2018.

13. R. A. Brewster and J.D. Franson, “Reduced Decoherence of Macroscopic States Using Squeezing and Antisqueezing”, Frontiers in Optical Science Conference, Washington, D.C., Sept. 18, 2018.

14. T.B. Pittman, J.D. Franson, R. A. Brewster, and I. Nodurft, ”Heralded Noiseless Amplification and Attenuation for Quantum Communications”, Quantum Optics IX Conference, Cartagena, Columbia, Oct. 2018.

15. R.A. Brewster and J.D. Franson, “Using an Optical Parametric Amplifier as a Noiseless Attenuator”, March meeting of the American Physical Society, Los Angeles, CA, March 8, 2018.

16. J.D. Franson, “Velocity-Dependent Forces and Maxwell’s Demon”, Conference on Information Engines at the Frontiers of Nanoscale Thermodynamics”, Telluride, CO, August 7, 2017 (invited).

17. J.D. Franson, “Entanglement and Decoherence in Optical Amplifiers”, IEEE Topicals Meeting, San Juan, Puerto Rico, July 17, 2017 (invited).

18. J.D. Franson and R.A. Brewster, “Effects of Entanglement in Optical Amplifiers”, CLEO conference, San Jose, CA, 14-19 May 2017.

19. R.A. Brewster and J.D. Franson, “Schrodinger Cat States and Quasiprobability Distributions”, CLEO conference, San Jose, CA, 14-19 May 2017.

20. J.D. Franson, “Generalized Delta Functions, Schrodinger Cats, and Decoherence”, Quantum and Beyond Conference, Vaxjo, Sweden, June 13, 2016.

21. J.D. Franson, “Nonlocal Interferometry using Schrodinger Cats”, Colloquium at the Stevens Institute of Technology, New York, NY, April 29, 2016 (Invited)

22. R.A. Brewster and J.D. Franson, “Exponentially Small Dependence of the Q-Function on Quantum Coherence”, APS meeting, Baltimore, MD, March 14-18, 2016.

23. G.T. Hickman, T. B. Pittman, and J.D. Franson, ”Ultra-Low Power Cross-Phase Shifts using Metastable Xenon in a High-Finesse Cavity”, APS meeting, Baltimore, MD, March 14-18, 2016.

24. J.D. Franson, “Nonlinear Properties of ‘Linear’ Optical Amplifiers”, IEEE Colloquium on Quantum Computing, College Park, MD, Oct. 12, 2016.

25. G.T. Hickman, T.B. Pittman, and J.D. Franson, “Cavity QED with Collective Excitations of Warm, 3-Level Atoms”, FIOS Conference, Rochester, NY, Oct. 10, 2016.

26. J.D. Franson and R. Brewster, “Linear Amplifier Noise and Which-Path Information”, FIOS Conference, Rochester, NY, Oct. 10, 2016.

27. J.D. Franson, “Entanglement and Decoherence”, QTPA Conference, Vaxjo, Sweden, June 8-11, 2015 (Invited).

28. G.T. Hickman, T.B. Pittman, and J.D. Franson, “Xenon-Based Nonlinear Fabry-Perot Interferometer for Quantum Information Applications”, CLEO/QELS Conference, San Jose, CA, May 10-15, 2015.

29. J.D. Franson and B.T. Kirby, “Effects of Distributed Amplifiers on Quantum Coherence”, CLEO/QELS Conference, San Jose, CA, May 10-15, 2015.

30. J.D. Franson, “Supernova 1987A and the Equivalence Principle”, Testing Gravity Conference, Vancouver, Canada, Jan. 14-18, 2015.

31. J.D. Franson, “Quantum Mechanics in Curved Spacetime: A Quantum-Mechanical Correction to the Speed of Light”, QTPA Conference, Vaxjo, Sweden, June 9-12, 2014.

32. J.D. Franson, “Compatibility of Quantum Mechanics and General Relativity”, DICE Conference, Castiglioncello, Italy, Sept. 15, 2014.

33. T.B. Pittman, D.E. Jones, and J.D. Franson, “Ultralow-power Nonlinear Optics Using Tapered Optical Fibers in Noble Gases”, CLEO/QELS Conference, San Jose, CA, June 8-13, 2014.

34. G.T. Hickman, T.B. Pittman, and J.D. Franson, “Nonlinear Optics at Ultra Low Power in a High-Finesse Optical Cavity with Metastable Xenon”, CLEO/QELS Conference, San Jose, CA, June 8-13, 2014.

35. D.E. Jones, J.D. Franson, and T.B. Pittman, “Saturation of Atomic Transitions with a Tapered Optical Fiber in Rubidium Vapor”, CLEO/QELS Conference, San Jose, CA, June 8-13, 2014.

36. B.T. Kirby and J.D. Franson, "Nonlocal Interferometry Using Macroscopic States and State Discrimination", CLEO/QELS Conference, San Jose, CA, June 8-13, 2014.

37. J.D. Franson, "Quantum-Mechanical Correction to the Speed of Light in a Gravitational Potential", April Meeting of the American Physical Society, Savannah, GA, April 5-8, 2014.

38. J.D. Franson, "Nonlocal Interferometry using Schrodinger Cats", Wigner Symposium, Budapest, Hungary, Nov. 11-13, 2013 (Invited).

39. T.B. Pittman, M.M. Lai, and J.D. Franson, "Enhanced Transmission for Ultra-Low-Power Nonlinear Optics Experiments Using Tapered Optical Fibers in Rubidium Vapor", CLEO/QELS Conference, San Jose, CA, June 9-14, 2013.

40. J.D. Franson, "Schrodinger Cats and Nonlocal Interferometry", Tenth Coherence and Quantum Optics Conference, Rochester, NY, June 17-20, 2013 (Invited)

41. B. T. Kirby and J.D. Franson, "Nonlocal Interferometry Using Macroscopic Coherent States and Weak Nonlinearities", March Meeting of the American Physical Society, Baltimore, MD, Mar. 18-22, 2013.

42. T. B. Pittman, J. Liang, and J.D. Franson, "Entangled Photon Holes", March Meeting of the American Physical Society, Baltimore, MD, Mar. 18-22, 2013.

43. J.D. Franson, "Quantum Communication Using Entangled Photon Holes", Frontiers in Optics Conference, Rochester, NY, Oct. 14-18, 2012. (Invited)

44. J.D. Franson, "Reduced Photon Velocities in a Gravitational Potential", DICE Conference, Castiglioncello, Italy, Sept. 14-21, 2012.

45. T.B. Pittman and J.D. Franson, "Optical Quantum Information Processing using Forced Fermion-like Behavior of Photonic Qubits", Quantum Information and Measurement Conference, Berlin, Germany, 19-21 March, 2012.

46. J.D. Franson, "Quantum Communication Using Entangled Photon Holes", Karles Invitational Conference, Naval Research Laboratory, Washington, DC, August 27-28, 2012 (Invited).

47. S.M. Hendrickson, C.N. Weiler, R.M. Camacho, P.T. Rakich, A.I. Young, M.J. Shaw, T.B. Pittman, J.D. Franson, and B.C. Jacobs, "Observation of Low-Contrast All-Optical Switching in Si_3N_4 Microdisks Based on the Zeno Effect", 2012 Nonlinear Photonics Topical Meeting, Colorado Springs, CO, June 18, 2012.

48. J. Liang, J.D. Franson, and T.B. Pittman, "Entangled Photon Holes and Non-classical Interferometers", SPIE Defense, Security, and Sensing conference, Orlando, FL, 25-29 April, 2011.

49. J.D. Franson, "Entanglement from Longitudinal and Scalar Photons", DAMOP conference, Atlanta Georgia, June 13-17, 2011.

50. M.M. Lai, S.M. Hendrickson, T.B. Pittman, and J.D. Franson, "Low Light-Level Two-Photon Absorption using Tapered Optical Fibers in Rubidium Vapor", CLEO/QELS conference, Baltimore, MD, May 1-6, 2011.

51. J.D. Franson, "Entanglement from Longitudinal and Scalar Photons", International Conference on Quantum Information, Ottawa, Canada, June 6-8, 2011 (Invited).

52. J.D. Franson and T.B. Pittman, "Quantum Logic Operations Using the Zeno Effect", CLEO/QELS conference, Baltimore, MD, May 1-6, 2011.

53. J.D. Franson, "Mathematical Constraint on Realistic Theories", March Meeting of the Americal Physical Society, Dallas, TX, Mar. 21-25, 2011.

54. T.B. Pittman and J.D. Franson, "Photonic Quantum Computing using Forced Fermion-Like Behavior", Tenth International Conference on Quantum Communication, Measurement, and Computation, Brisbane, Australia, July 19-23, 2010.

55. S.M. Hendrickson, M.M. Lai, T.B. Pittman, and J.D. Franson, "Observation of Two-Photon Absorption at Low Power Levels using Tapered Optical Fibers and Rubidium Vapor", Frontiers in Optical Science Conference, Rochester, NY, Oct. 25-29, 2010.

56. J.D. Franson, "Entanglement from Longitudinal and Scalar Photons", Frontiers in Optical Science Conference, Rochester, NY, Oct. 25-29, 2010.

57. J.D. Franson, "Nonclassical Nature of Nonlocal Dispersion Cancellation", CLEO/QELS Conference, San Jose, CA, May 19-20, 2010.

58. T.B. Pittman, S.M. Hendrickson, J. Liang, and J.D. Franson, "Experimental Work on Entangled Photon Holes", 11th International Conference on Squeezed States and Uncertainty Relations, Olomouc, Czech Republic, June 22-26, 2009.

59. J.D. Franson, "Negative Probabilities in Quantum Optics", 5th Conference on Quantum Theory: Reconsideration of Foundations, Vaxjo, Sweden, June 15-18, 2009.

60. J.D. Franson, "Entanglement and the Feynman Propagator", 2nd Vienna Symposium on the Foundations of Modern Physics, Vienna, Austria, June 11-14, 2009.

61. S.M. Hendrickson, T.B. Pittman, and J.D. Franson, "Nonlinear Transmission of a Tapered Fiber in Rubidium", CLEO/IQEC Conference, Baltimore, MD, May 31-June 5, 2009.

62. Hao You, S.M. Hendrickson, and J.D. Franson, "Analysis of Two-Photon Absorption in Tapered Fibers", CLEO/IQEC Conference, Baltimore, MD, May 31-June 5, 2009.

63. J. Liang, J.D. Franson, and T.B. Pittman, "Proposed Bell's Inequality Test Using Entangled Photon Holes", CLEO/IQEC Conference, Baltimore, MD, May 31-June 5, 2009.

64. J.D. Franson and B.C. Jacobs, "Classical Logic Operations Using the Quantum Zeno Effect", 3rd International Conference on Quantum Information, Boston, MA, July 13-16, 2008.

65. J.D. Franson, "Generation of Entanglement Outside of the Light Cone", 39th Annual Meeting of the APS Division of Atomic, Molecular, and Optical Physics, State College, PA, May 27-31, 2008.

66. J.D. Franson, "Beyond Bell's Inequality", 38th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, Utah, January 8, 2008 (Invited).

67. T.B. Pittman and J.D. Franson, "Towards Bell Tests and Quantum Communication with Entangled Photon Holes", International Conf. on Quantum Information, Rochester, NY, June 15, 2007 (Invited)

68. S.M. Hendrickson, T.B. Pittman, and J.D. Franson, "Microcavities Using Holey Fiber", CLEO/QELS Conference, Baltimore, MD, May 4-9, 2007.

69. J.D. Franson and T.B. Pittman, "Entangled Photon Holes", Third Feynman Festival Conference, College Park, MD, August 25-29. (Invited)

70. T.B. Pittman and J.D. Franson, "Entangled Photon Holes", 2006 CLEO/QELS meeting, Long Beach, CA, May 22, 2006.

71. J.D. Franson, "Zeno Logic Gates", 2006 Gordon Research Conference on Quantum Information Science, Barga, Italy, May 7-12, 2006.

72. J.D. Franson, "Quantum Computing Using Linear Optics and Hybrid Approaches", presentation at the SPIE Defense and Security Symposium, Orlando, FL, 17-21 April, 2006. (Invited)

73. B.C. Jacobs, S. Hendrickson, M. Dennis, and J.D. Franson, "Quantum Cryptography at 830 nm in Standard Telecommunications Fiber", SPIE Defense and Security Symposium, Orlando, FL, 17-21 April, 2006.

74. J.D. Franson, "Beyond Linear Optics: Zeno Gates and Photon Holes", International Workshop on Linear Optical Quantum Information Processing, Baton Rouge, LA, April 9-12, 2006. (Invited)

75. B.C. Jacobs, T.B. Pittman, and J.D. Franson, “Single Photon Switches for Quantum Information Processing”, 2006 APS March Meeting, Baltimore, MD, March 16, 2006.

76. J.D. Franson, “Entangled Photon Holes”, presentation at the 2006 APS March Meeting, Baltimore, MD, March 16, 2006.

77. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Single-Photon Sources for Linear Optics Quantum Computing", presentation at the 2006 APS March Meeting, Baltimore, MD, March 16, 2006.

78. J.D. Franson, “Entangled Photon Holes”, Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, Jan. 2-6, 2006. (Invited)

79. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Quantum Error Correction using Linear Optics", Optical Society of America Annual Meeting, Tucson, AZ, October 5, 2005.

80. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Techniques for Heralding Single Photons from Pulsed Parametric Down-Conversion", SPIE Quantum Communications and Quantum Imaging III, San Diego, CA, August 3, 2005. (Invited)

81. B.C. Jacobs, T.B. Pittman, and J.D. Franson, "Single-Photon Switches for Quantum Information Processing", CLEO/QELS 05, Baltimore, MD, May 23, 2005.

82. J.D. Franson, “Recent progress in linear optics quantum computing”, Workshop on Quantum Information Processing with Linear Optics (QUIPROLO II), Bristol, UK, March 29-31, 2005. (Invited)

83. T.B. Pittman, B.C. Jacobs, and J.D. Franson, “Heralding Single Photons from Pulsed Parametric Down-Conversion”, 35th Winter Colloqium on the Physics of Quantum Electronics, Snowbird, UT, January 2, 2005.

84. J.D. Franson, “Linear Optics Quantum Computing”, 35th Winter Colloqium on the Physics of Quantum Electronics, Snowbird, UT, January 2, 2005 (Invited).

85. T.B. Pittman, B.C. Jacobs, and J.D. Franson, “Simple Quantum Circuit of Linear Optics Gates”, Optical Society of America Annual Meeting, Rochester, NY, October 11, 2004.

86. J.D. Franson, “Quantum Computing Using Linear Optics and the Zeno Effect”, ERATO Conference on Quantum Information Sciences 2004, Tokyo, Japan, September 1-6, 2004 (Invited).

87. J.D. Franson, “Quantum computing using single photons and the Zeno effect”, Second Feynman Festival, College Park, MD, August 25, 2004 (Invited).

88. T.B. Pittman, B.C. Jacobs, and J.D. Franson, “Simple Circuits of Linear Optics Quantum Logic Gates”, SPIE Quantum Communications and Quantum Imaging II, Denver, CO, August 5, 2004. (Invited)

89. J.D. Franson, B.C. Jacobs, and T.B. Pittman, “Quantum Computing using linear optics and the Zeno effect, Seventh International Conference on Quantum Communication, Measurement, and Computing, Glasgow, Scotland, July 28, 2004 (Invited.)

90. J.D. Franson, B.C. Jacobs, and T.B. Pittman, “Quantum Computing using Single Photons and the Zeno Effect, Quantum Information and Quantum Control Conference, Toronto, Canada, July 19, 2004.

91. J.D. Franson, “Quantum Information Processing Using Photons”, 35th Meeting of the Division of Atomic, Molecular and Optical Physics, Tucson, AZ, May 27, 2004 (Invited).

92. T.B. Pittman, B.C. Jacobs, and J.D. Franson, “Experimental Quantum Encoder for Single-Photon Qubits”, CLEO/IQEC conference, San Francisco, CA, May 17, 2004.

93. J.D. Franson, B.C. Jacobs, and T.B. Pittman, “Hybrid Optical Approach for Optical Quantum Computing”, CLEO/IQEC conference, San Francisco, CA, May 17, 2004.

94. J.D. Franson, “Quantum Information Processing with Linear Optics and the Zeno Effect”, Workshop on Quantum Information Processing with Linear Optics, Erlangen, Germany, April 14-16, 2004 (Invited).

95. J.D. Franson, “Hybrid Optical Approach to Quantum Computing”, Conference on Quantum Information with Atoms, Ions, and Photons, La Thuile, Italy, March 6-12, 2004 (Invited).

96. B.C. Jacobs and J.D. Franson, "Incremental Information Extraction from Grover's Algorithm", Winter International Symposium on Information and Communication Technologies, Mexico, January 5, 2004.

97. J.D. Franson, “Linear Optics Quantum Computing”, 34th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, Utah, January 4-8, 2004 (Invited).

98. J.D. Franson, M.J. Fitch, B.C. Jacobs, and T.B. Pittman, “Linear Optical Quantum Computing”, 87th OSA Annual Meeting, Tucson, AZ, October 5-9, 2003. (Invited).

99. T.B. Pittman and J.D. Franson, “Violation of Bell’s Inequality with Photons from Independent Sources”, 87th OSA Annual Meeting, Tucson, AZ, October 5-9, 2003.

100. T.B. Pittman, B.C. Jacobs, and J.D. Franson, “Single-Photon Source and Quantum Memory”, “Single-Photon Source and Quantum Memory”, SPIE Quantum Communications and Quantum Imaging, San Diego, CA, August 5, 2003. (Invited)

101. B.C. Jacobs, T.P. Pittman, M.J. Fitch, and J.D. Franson, "Quantum Logic Operations in Optical Fibers", Quantum Electronics and Laser Science Conference, Baltimore, MD, June 1-6, 2003.

102. M.J. Fitch, M.M. Donegan, B.C. Jacobs, T.B. Pittman, and J.D. Franson, "Improved Single-Photon Detector Performance, Quantum Electronics and Laser Science Conference, Baltimore, MD, June 1-6, 2003.

103. J.D. Franson, M.M. Donegan, M.J. Fitch, B.C. Jacobs, and T.B. Pittman, "High-Fidelity Quantum Logic Operations and Entangled Ancilla States", Quantum Electronics and Laser Science Conference, Baltimore, MD, June 1-6, 2003.

104. M.J. Fitch, M.M. Donegan, T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Quantum Computation with Linear Optics", 17th International Symposium on Aerospace/Defense Sensing, Simulation, and Controls, Orlando, FL, 21 April 2003. (Invited).

105. T.B. Pittman, M.J. Fitch, B.C. Jacobs, and J.D. Franson, "Experimental Controlled-NOT Logic Gate for Single Photons", Gordon Research Conference on Quantum Information Science, Ventura, CA, March 23-28, 2003.

106. T.B. Pittman, M.M. Donegan, M.J. Fitch, B.C. Jacobs, and J.D. Franson, "Need for High Efficiency Photon-Number Resolving Detectors in Linear Optics Quantum Computing", NIST-ARDA Workshop on single-photon detectors, Gaithersburg, MD, March 31, 2003.

107. B.C. Jacobs, M.M. Donegan, M.J. Fitch, T.B. Pittman, and J.D. Franson, "Demonstration of Quantum Logic Operations Using Linear Optical Elements", U.S.-Australia Workshop on Solid State and Optical Approaches to Quantum Information Science, Sydney, Australia, 7 January 2003. (Invited)

108. J.D. Franson, M.M. Donegan, M.J. Fitch, B.C. Jacobs, and T.B. Pittman, "Progress in Linear Optics Quantum Computing", 33rd Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, 5-9 January, 2003. (Invited).

109. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Single-Photon Source and Quantum Memory", Optical Society of America Annual Meeting, Orlando, FL, October 3, 2002.

110. B.C. Jacobs, T.B. Pittman, and J.D. Franson, "Quantum Non-Demolition Measurements and Quantum Relays Using Linear Optics", OSA Annual Meeting, Orlando, FL, September 30, 2002.

111. J.D. Franson, B.C. Jacobs, and T.B. Pittman, "Quantum Computing Using Linear Optics", Feynman Festival Conference, College Park, MD, 23 -28 Aug., 2002. (Invited)

112. J.D. Franson, "Quantum Logic Operations Using Linear Optical Elements", Nonlinear Optics Conference, Maui, Hawaii, 29 Jul.-2 Aug., 2002. (Invited)

113. J.D. Franson, B.C. Jacobs, and T.B. Pittman, "Demonstration of Probabilistic Quantum Logic Operations Using Linear Optics", 6th International Conference on Quantum Communication, Measurement, and Computing, Cambridge, MA, 22-26 July, 2002.

114. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Demonstration of Non-deterministic Quantum Logic Operations Using Linear Optical Elements", Quantum Electronics and Laser Science Conference, Long Beach, CA, 19-24 May, 2002.

115. J.D. Franson, "Dispersion Cancellation and Nonclassical Noise Reduction for Large Photon-Number States", Quantum Electronics and Laser Science Conference, Long Beach, CA, 19-24 May, 2002.

116. B.C. Jacobs, T.B. Pittman, and J.D. Franson, "Demonstration of Non-Deterministic Quantum Logic Operations using Linear Optical Elements", Meeting of the Division of Atomic, Molecular, and Optical Physics of the American Physical Society, Williamsburg, VA, 28 May - June 1, 2002.

117. J.D. Franson, B.C. Jacobs, and T.B. Pittman, "Experimental Demonstration of Quantum Logic Operations using Linear Optical Elements", 4th Adriatico Research Conference on Quantum Interferometry, Trieste, Italy, 11-15 March 2002. (Invited)

118. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Demonstration of Non-deterministic Quantum Logic Operations using Linear Optical Elements", 32nd Winter Colloquium on the Physics of Quantum Electronics, Snow Bird, UT, 6-19 January, 2002. (Invited)

119. M.J. Fitch and J.D. Franson, "High Resolution Quantum Optics Applied to Metrology and Clocks", 32nd Winter Colloquium on the Physics of Quantum Electronics, Snow Bird, UT, 6-19 January, 2002. (Invited)

120. T.B. Pittman, B.C. Jacobs, and J.D. Franson, "Demonstration of Non-deterministic Quantum Logic Operations Using Linear Optical Elements", Conference on Quantum Information, Santa Barbara, CA, 3-7 December, 2001.

121. J.D. Franson, "Quantum Communications", tutorial presented at the International Conference on Quantum Information, Rochester, NY, 10-13 June, 2001. (Invited)

122. J.D. Franson and M. Donegan, "Perturbation Theory for Quantum-Mechanical Observables", 7th International Conference on Squeezed States and Uncertainty Relations, Boston, MA, 4-8 June, 2001. (Invited)

123. J.D. Franson, "Quantum Communications", tutorial presented at the Quantum Electronics and Laser Science Conference, Baltimore, MD, 6-11 May, 2001. (Invited)

124. J.D. Franson and T.B. Pittman, "Quantum Logic Using Photon-Exchange Interactions: Theory and Experiment", 31st Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, 7-11 January, 2001. (Invited)

125. J.D. Franson and T.B. Pittman, "Single-Photon Logic and Memory, Workshop on Quantum Optics, Jackson Hole, WY, 30 July, 2000. (Invited)

126. J.D. Franson and T.B. Pittman, "Nonlinear Optics at Single-Photon Intensities", 30th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, 9-12 January, 2000. (Invited)

127. T.B. Pittman and J.D. Franson, "Quantum Logic Using Photon-Exchange Interactions", Quantum Electronics and Laser Science Conference, San Francisco, CA, 7-12 May, 2000.

128. J.D. Franson and T.B. Pittman, "Quantum Logic Using Photon-Exchange Interactions", Optical Society of America Annual Meeting, Santa Clara, CA, 26-30 September, 1999.

129. J.D. Franson and T.B. Pittman, "Dicke-State Analysis of Nonlinear Phase Shifts from Photon-Exchange Interactions", Quantum Communication, Measurement, and Computing Conference, Capri, Italy, 3-7 July, 2000. (Invited)

130. J.D. Franson and T.B. Pittman, "Nonlinear Optics at Low Intensities Using Photon Exchange Interactions", Laser Physics '99 Conference, Budapest, Hungary, 3 July, 1999 (Invited)

131. T.B. Pittman and J.D. Franson, "Quantum Logic Gates Using Photon Exchange Interactions", Quantum Electronics and Laser Science Conference, Baltimore, MD, 24 May, 1999.

132. J.D. Franson and T.B. Pittman, "Quantum Logic and Control Using Photon Exchange Interactions", Adriatico Research Conference on Quantum Interferometry, Trieste, Italy, 4 March, 1999. (Invited)

133. J.D. Franson and T.B. Pittman, "Two-Photon Nonlinear Interactions for Use in Quantum Logic Gates", Optical Society of America Annual Meeting, Baltimore, MD, 8 October, 1998.

134. J.D. Franson and T.B. Pittman, "Two-Photon Interactions for Use in Quantum Computing", Quantum Communication, Measurement, and Computing Conference, Northwestern University, 22-27 August, 1998. (Invited)

135. J.D. Franson and T.B. Pittman, "Photon Exchange Interactions for Quantum Logic Gates", Summer Workshop in Quantum Optics, Jackson Hole, WY, 26-30 July, 1999. (Invited)

136. J.D. Franson and T.B. Pittman, "An Optical Approach to Quantum Computing - Photon Exchange", Workshop on Demonstrations and Algorithmic Development for Quantum Computers, Bowie, MD, 8 June, 1998. (Invited)

137. J.D. Franson and T.B. Pittman, "Optical Approach to Quantum Computing", SPIE International Symposium on Aerospace/Defense Sensing, Simulation, and Controls, Orlando, FL, 15 April, 1998. (Invited)

138. J.D. Franson and T.B. Pittman, "An Optical Approach to Quantum Computing", 28th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, 5 January, 1998. (Invited)

139. J.D. Franson and T.B. Pittman, "Experimental Investigation of a New Optical Approach for the Construction of Quantum Logic Gates", Optical Society of America Annual Meeting, Long Beach, CA, 13 October, 1997.

140. J.D. Franson and T.B. Pittman, "Enhancement of Nonlinear Phase Shifts at the Two-Photon Level", Quantum Electronics and Laser Science conference, Baltimore, MD, 21 May 1997.

141. J. D. Franson, "Cooperative Enhancement of Optical Quantum Logic Gates", Optical Society of America Annual Meeting, Rochester, NY, 21 October, 1996.

142. J.D. Franson and B.C. Jacobs, "Quantum Cryptography without Optical Fibers", Quantum Electronics and Laser Science conference, 7 June 1996.

143. J.D. Franson, "Splitting of Single Photons by an Ordinary Beam Splitter", Quantum Electronics and Laser Science conference, 7 June 1996.

144. J.D. Franson, "Quantum Optics in Communications", tutorial at the Optical Society of America Annual Meeting, Portland, OR, 14 September, 1995. (Invited)

145. J.D. Franson, "New Interpretation of the Aharonov-Bohm Effect", Quantum Electronics and Laser Science conference, 23-25 May, 1995.

146. J.D. Franson, "Change and Uncertainty in Quantum Optics", Quantum Electronics and Laser Science conference, 23-25 May, 1995.

147. J.D. Franson, "Dynamic Phase of the Electromagnetic Field", Conference on Quantum Coherence and Interference in Fundamental and Applied Physics, Crested Butte, CO, 8-11 August, 1994. (Invited)

148. J.D. Franson and B.C. Jacobs, “Progress Towards Atomic Interferometry Using Diffraction from Crystal Surfaces”, Second Workshop on Optics and Interferometry with Atoms, Peyresq, France, 27-30 June, 1994. (Invited)

149. J.D. Franson and B. C. Jacobs, “Quantum Cryptography - Theory and Practice”, 24th Winter Colloquium on Quantum Electronics, Snowbird, UT, 4-7 January, 1994. (Invited)

150. J.D. Franson, “Consistency of Quantum Phase Measurements”, Quantum Electronics and Laser Science Conference, Baltimore, MD, 6 May, 1993.

151. J.D. Franson and H. Ilves, “Experimental Comparison of Two Methods for Quantum Cryptography”, Quantum Electronics and Laser Science Conference, Baltimore, MD, 7 May, 1993.

152. J.D. Franson, “Nonlocal Cancellation of Dispersion”, annual meeting of the Optical Society of America, San Jose, CA, 7 November 1991.

153. J.D. Franson, “Two-Photon Interferometry over Large Distances”, Proceedings of the Second International Wigner Conference, Goslar, Germany, 15-20 July, 1991.

154. J.D. Franson, “Quantum Interference for Macroscopic Fields”, Conference on the Foundations of Quantum Mechanics, Santa Fe, NM, 28 May to 1 June 1990. (Invited)

155. J.D. Franson, "Extension of the Einstein-Podolsky-Rosen Paradox", Bull. Am. Phys. Soc. **26**, 531 (1981).

Other Professional Presentations

1. J.D. Franson, “Violations of Bell’s Inequality for Macroscopic States”, JQI seminar at the University of Maryland College Park, College Park, MD, Nov. 2, 2020 (online).

2. J.D. Franson, “Use of Optical Amplifiers in Entanglement Distribution”, colloquium at the Laboratory for Physical Sciences, College Park, MD, June 8, 2017.

3. J.D. Franson, “Quantum Mechanics in Curved Spacetime”, colloquium at the University at Buffalo, Buffalo, N.Y., April 23, 2015.

4. J.D. Franson, “Quantum Entanglement”, MASPG group meeting, College Park, MD, Feb. 18, 2015.

5. J.D. Franson, “Quantum Entanglement: Einstein’s Spooky Action at a Distance”, Philosophical Society of Washington, Washington, D.C., Oct. 24, 2014.

6. J.D. Franson, “Quantum Mechanics in Curved Spacetime”, colloquium at the University of California at Merced, Nov. 7, 2014.

7. J.D. Franson, “Nonlocal Interferometry Using Schrodinger Cats”, colloquium at the University of Delaware, April 21, 2014.

8. J.D. Franson, “Schrodinger Cats and Nonlocal Interferometry”, colloquium at the University of Rochester, Mar. 28, 2013.

9. J.D. Franson, “Sensitivity of Entangled Photon Holes to Loss and Amplification”, colloquium at Northwestern University, Jan. 18, 2012.

10. J.D. Franson, “Sensitivity of Entangled Photon Holes to Loss and Amplification”, colloquium at Yale University, Nov. 30, 2011.

11. J.D. Franson, “Entanglement from Longitudinal and Scalar Photons”, colloquium at Princeton University, Nov. 1, 2010.

12. J.D. Franson, “An Optical Approach to Quantum Computing”, lecture at the British Computer Society, London, 22 May, 1998.

13. J.D. Franson, “Nonlocality in Quantum Computing”, colloquium at the Johns Hopkins University physics department, Baltimore, MD, 4 December, 1997.

14. J.D. Franson, “Quantum Cryptography and Quantum Computing”, Minkowski Lecture, Johns Hopkins University, Baltimore, MD, 8 April, 1997.

15. J.D. Franson, “Recent Developments in Quantum Cryptography”, meeting of the National Capital Section of the Optical Society of America, Wheaton, MD, 16 January, 1996.

16. J.D. Franson, "Quantum Cryptography", feature article in Optics and Photonics News **6**, 30-33 (1995).

17. J.D. Franson, “Two-Photon Interferometry and Objective Realism”, colloquium presented at Columbia University, 11 February 1991.

18. J.D. Franson, “Nonlocal Quantum Effects and Their Practical Applications”, J. D. Franson, colloquium given at the University of Maryland Baltimore County, 25 April 1990.

Patents

1. T.B. Pittman, D. Jones, G. Hickman, and J.D. Franson, "Nanofiber-Segment Ring Resonator", U.S. patent #10,884,189, 5 January, 2021.

2. T.B. Pittman and J.D. Franson, "Method and Apparatus for Single-photon Source and Quantum Memory", U.S. patent # 7,355,769, 8 Apr., 2008.

3. J.D. Franson, B.C. Jacobs, and T.B. Pittman, "Techniques for use of Nanocavities to Enhance Quantum Processing with Photons and the Zeno Effect", U.S. patent # 7,236,667, 26 June, 2007.

4. T.B. Pittman, J.D. Franson, and B.C. Jacobs, "Method and Apparatus for Single-photon Source and Quantum Memory", U.S. patent # 7,019,875, 28 Mar., 2006.

5. J.D. Franson, M.M. Donegan, M.J. Fitch, B.C. Jacobs, and T.B. Pittman, "Techniques for High-Fidelity Quantum Teleportation and Computing", U.S. patent # 7,006,267, 28 Feb., 2006.

6. J.D. Franson, B.C. Jacobs, and T.B. Pittman, "Techniques for Quantum Processing with Photons and the Zeno Effect", U.S. patent # 6,995,404, 7 Feb., 2006.

7. T.B. Pittman, J.D. Franson, and B.C. Jacobs, "Techniques for Performing Logic Operations using Quantum States of Single Photons", U.S. patent # 6,741,374, 25 May, 2004.

8. J.D. Franson, "Optical Method for Quantum Computing", U.S. patent # 6,678,450, 13 January, 2004.

9. J.D. Franson, "Apparatus and Method for Quantum Mechanical Encryption for the Transmission of Secure Communications", U. S. patent # 5,243,649, 7 September, 1993.

SERVICE TO THE DEPARTMENT, UNIVERSITY, COMMUNITY, AND PROFESSION

Service to the Department

2007 - 2015	Chair, Departmental Affairs Committee
2015	Chair, Faculty Search Committee

2014 – 2015	Member, Strategic Planning Committee
2014	Member, Department Promotion and Tenure Committee
2014	Member, Graduate Curriculum Committee
2011	Member, Post-Tenure Review Committee
2008	Member, Undergraduate Advisor Committee
2008 - 2015	Member, Departmental signature authority
2007	Co-chair, Seminar Committee
2006 - 2009	Member, Post-Tenure Review Committee

Service to the University

2010-2012	Member, University Faculty Review Committee
2011-2013	Member, Academic Misconduct Committee

Service to the Community

2006 - 2008	Consultant to the Johns Hopkins University Applied Physics Laboratory

Service to the Profession

2015	Member, organizing committee, Frontiers in Optics Conference.
2014	Member, organizing committee, Quantum Information and Measurement Conference.
2012	Member, organizing committee, Quantum Information and Measurement Conference.
2010-2012	Member, organizing committee, Quantum Optics, QELS 2005.
2007	Member of organizing committee, International Conf. on Quantum Information, 2007.
2005	Chairman, organizing committee, Quantum Optics, QELS 2005.
2004	Member, organizing committee, IQEC 2004.
2002	Member, organizing committee, Quantum Optics, QELS 2002.
2001	Member, organizing committee, Quantum Optics, QELS 2001.
2001	Member of advisory committee, 7th International Conference on Squeezed States, 2001.
2000-2003	Member, editorial board, Physical Review A
1999	Member, organizing committee, Second Workshop on Fundamental Problems in Quantum Theory.
1994	Member, organizing committee, Symposium on Quantum Optics in Communications, OSA Annual meeting.
1992-2006	Member, editorial board, Johns Hopkins APL Technical Digest
1992 – present	Member, American Physical Society.