Contact Information

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Education

1980	BA (*magna cum laude*)	Mathematics & Economics	Rice University
1991	PhD	Mathematics	University of Texas at Austin

Dissertation Adviser: David J. Saltman
Dissertation Title: *Extension and Contraction Properties of Dubrovin Valuation Rings*

Employment History

- **Professor** - Denison University, Department of Mathematics and Computer Science. May, 2003 to Present.

- **Associate Professor** - Denison University, Department of Mathematics and Computer Science. May, 1996 to May, 2003.

- **Assistant Professor** - Denison University, Department of Mathematical Sciences. August, 1990 to May, 1996.

- **Instructor** - Denison University, Department of Mathematical Sciences. January, 1990 - August, 1990.

- **Instructor** - Austin Community College. August, 1988 - December, 1989.

- **Learning Specialist** - Learning Skills Center, The University of Texas at Austin. August, 1989 - December, 1989.

- **Assistant Instructor** - Department of Mathematics, The University of Texas at Austin. August, 1987 - May, 1989.

- **Research Assistant** - Department of Mathematics, The University of Texas at Austin. January, 1987 - May, 1987.

- **Teaching Assistant** - Department of Mathematics, The University of Texas at Austin. September, 1983 - August, 1987.

- **Bank Consultant** - Independent consultant to C.E.O. of Guaranty National Bank in Austin, Texas. January, 1984 to August, 1986.

- **Vice-President/Controller** - InterFirst Bank Post Oak in Houston, Texas. October, 1981 to May, 1983.

- **Investment Analyst** - Republic of Texas Savings in Houston, Texas. May, 1979 to October, 1981

Book

With B. Schumacher, *Quantum Processes, Systems and Information*, Cambridge University Press, April, 2010.

Research Publications

- With B. Schumacher, "Non-Boolean derived logics for classical system", *Physical Review A*, Volume 48, Number 2 (August, 1993) 977-985.

- With B. Schumacher, "Zeno's arrow and classical phase space logic", *Foundations of Physics Letters*, Volume 7, Number 3 (June, 1994) 259-271.

- With P. Hausladen, B. Schumacher, and W. Wootters, "Sending classical bits via quantum it", in *Fundamental Problems in Quantum Mechanics*, D. Greenberger and A. Zeilinger, eds.,New York Academy of Sciences, 1995.

- With B. Schumacher and S. Bailey, "Three-valued logics for classical phase space", *International Journal of Theoretical Physics*, Volume 35, Number 1, (January, 1996), 31-62.

- With P. Hausladen, B. Schumacher, and W. Wootters, "Classical information capacity of a quantum channel", *Physical Review A*, Volume 54 (September, 1996), 1869-1876.

- With B. Schumacher and W. Wootters, "Limitation of the amount of accessible information in a quantum channel", *Physical Review Letters*, Volume 76 (April, 1996), 3452.

- With B. Schumacher, "Sending classical information via noisy quantum channels", *Physical Review A*, Volume 56 (July, 1997), 131-138.

- With J. Krone and B. Schumacher, "Analysis of billiard ball computation using phase space logic", *Physica D*, Volume 120 (September, 1998), 236 - 252.

- With B. Schumacher, "Coherent information and quantum cryptography", *Physical Review Letters*, Volume 80 (June, 1998), 5695 - 5697.

- With B. Schumacher, "Capacities of Quantum Channels and Quantum Coherent Information", *Quantum Computing and Quantum Communications, Lecture Notes in Computer Science* 1509, Springer Verlag, New York, 1999.

- With B. Schumacher, "Classical Capacity of Quantum Channels, Coherent Quantum Information and Quantum Privacy", *Proceedings of the 1998 IEEE International Symposium on Information Theory.*

- With B. Schumacher, "Characterizations of Classical and Quantum Communications Processes", *Chaos, Solitons & Fractals*, Vol. 10 (September, 1999), 1719 - 1736.

- With J. Krone, "Collision models for multiple-value logic gates", *Journal of Multiple Valued Logic*, Volume 6 (2001), 405 - 421.

- With B. Schumacher, "Optimal signal ensembles", *Physical Review A*, Volume 63, 022308 (February, 2001).

- With B. Schumacher, "Indeterminate length quantum coding", *Physical Review A*, Volume 64, 042304 (September, 2001).

- With J. Krone, "Implication in twin open set logic", *Collision-Based Computing, Lecture Notes in Computer Science*, Andrew Adamatzky (editor) Springer Verlag, New York (2002).

- With B. Schumacher, "Relative entropy in quantum information theory", *American Mathematical Society Contemporary Mathematics Series: Quantum Information and Quantum Computation*, Volume 305, American Mathematical Society, Providence (2002).

- With B. Schumacher, "Entanglement measures and quantum channels", special issue on quantum information theory *Journal of Mathematical Physics*, Volume 43, Number 9 (September, 2002), 4279 - 4285.

- With B. Schumacher, "Approximate quantum error correction", *Journal of Quantum Information Processing*, Volume 1 (April, 2002), 5 - 12 .

- With B. Schumacher, "Locality and information transfer in quantum operations", *Journal of Quantum Information Processing*, Volume 4 (February, 2005), 13 - 34.

- With N. Linden, S. Popescu, and B. Schumacher, "Reversibility of local transformations of multiparty entanglement", *Journal of Quantum Information Processing*, Volume 4 (August, 2005), 241 - 250.

- With T. Fressola, S. Paunov, and J. Krone, "Characterization of Boolean Topological Logics", *Journal of Multiple - Valued Logic*, (January, 2006).

- With B. Schumacher, "Quantum mutual information and the one-time pad", *Physical Review A*, Vol. 74, No. 4, (October, 2006), 2305 - 2308.

- With B. Schumacher, "Reverend Bayes takes the Unexpected Examination", *Math Horizons*, (September, 2008).

- **With B. Schumacher, "Isolation and information flow in quantum dynamics", *Foundations of Physics*, (May 2012).**

- **With B. Schumacher, "Modal quantum theory", *Foundations of Physics*, (May 2012).**

- **With B. Schumacher, "Possibility, probability and entanglement: Noncontextuality in modal quantum mechanics", AIP Conference Proceedings 1424, 364 (2012).**

- **With B. Schumacher, "Almost quantum theory", submitted chapter for book *Quantum Theory: Informational Foundations and Foils.***

Lectures presented

- Subversive Thoughts about Logic. As participant in Ohio Colleges Speaker's Circuit. Kenyon College; February, 1991 and Oberlin College; November, 1991.

- Quantum Logic. Denison Scientific Association. November, 1991.

- Non-Euclidean Geometry. Denison Honors Program Chowder Hour. November, 1991.

- Nonclassical Logics for Classical Mechanics. As participant in Ohio Colleges Speaker's Circuit. Wooster College; November, 1992.

- Nonstandard Logics and Zeno's Arrow. Undergraduate Physics Colloquium. Denison University; February, 1993.

- Three-valued Subversive Thoughts about Logic. Denison Scientific Association; February, 1995.

- Quantum Information Theory. Undergraduate Physics Colloquium. Denison University; March, 1995.

- Three-valued Logics and Zeno's Arrow. As participant in Ohio Colleges Speaker's Circuit. Ohio Wesleyan University; April, 1995.

- Classical Information Capacity of a Quantum Channel. Special session on quantum information theory at the annual meeting of the American Mathematical Society in Orlando, Florida; January, 1996.

- An Information Theoretic Interpretation of von Neumann Entropy. PhysComp 96 meeting in Boston, Massachusetts; November, 1996

- Quantum Coherent Information and Quantum Privacy. Ohio Section of the American Physical Society Fall 1997 meeting in Miami, Ohio; October, 1997.

- Capacities of Quantum Channels and Quantum Coherent Information, First NASA International Conference on Quantum Computing and Quantum Communications in Palm Springs, California; February, 1998.

- The Weirdest Thing we do not Know: Quantum Entanglement, Denison Faculty Luncheon; March 3, 1998.

- Quantum Entanglement: The Weirdest Thing we do not Know, as participant in Ohio Colleges Speaker's Circuit. Kenyon College; March 17, 1998.

- Classical Capacity of Quantum Channels, Coherent Quantum Information and Quantum Privacy, 1998 IEEE International Symposium on Information Theory held at the Massachusetts Institute of Technology in August, 1998.

- Optimal Signal Ensembles, 1999 Colloquium on the Foundations of Quantum Mechanics, University of Maryland Baltimore County; August, 1999.

- Relative Entropy and Multiparty Entanglement, Special session on quantum information theory at the annual meeting of the American Mathematical Society in Washington, D.C.; January, 2000.

- Thermodynamic Cost of Quantum Communication, Special session on quantum information theory at the Spring 2000 Meeting of the Eastern Section of the American Mathematical Society in Lowell, Massachusetts; April, 2000.

- With B. Schumacher, Entanglement measures and quantum channels, (presented by Westmoreland) 2001 International Conference on Quantum Information; University of Rochester; June 2001.

- Perfect and Approximate Quantum Error Correction, Feynman Festival; University of Maryland, College Park; August 2002.

- Approximate quantum error correction, 2002 Special session on quantum information at the Fall 2002 Eastern Section Meeting of the American Mathematical Society at Northeastern University; October 2002.

- Is the Holevo capacity additive? Institute for Quantum Information Seminar, Caltech, March 12, 2003.

- Topological Logics for Classical Mechanical Systems, Summer Conference on Topology and its Applications, Granville, Ohio, July 2005.

- Reverend Bayes Takes the Unexpected Examination, College of Wooster Mathematics Colloquium, Wooster, Ohio, November, 2005.

- Bayesian Analysis of a Paradox of Induction, Susquehana Mathematics Colloquium, Selinsgrove, Pennsylvania, March, 2006.

- Quantum Mutual Information and the One-time Pad, International Conference on Quantum Information (ICQI) in Rochester, New York, June 2007.

- Quantum Mechanics is What Happens When No One is Looking, Susquehana Research Experience for Undergraduates in Quantum Information Theory, Selinsgrove, Pennsylvania, July, 2008.

- Quantum Mechanics is What Happens When No One is Looking, College of Wooster Mathematics Colloquium, Wooster, Ohio, October, 2008.

- Quantum Mechanics is What Happens When No One is Looking, Air Force Institute of Technology Mathematics and Physics Colloquium, Wright Patterson Air Force Base, Ohio, April, 2009.

- When Infinity is Close Enough. As participant in Ohio Colleges Speaker's Circuit. Ohio Wesleyan University; April, 2009.

- Entanglement in Finite Vector Spaces, Susquehana Research Experience for Undergraduates in Quantum Information Theory, Selinsgrove, Pennsylvania, July, 2009.

- Bell Type Result in Vector Space over a Field of Characteristic Two, Susquehana Research Experience for Undergraduates in Quantum Information Theory, Selinsgrove, Pennsylvania, July, 2009.

- Isolation and Information Flow in Quantum Dynamics, Invited Lecture, Quantum Physics and Logic Workshop, Oxford University, Oxford, England, May 30, 2010.

- Open Systems in Modal Quantum Theory, Quantum Foundations Lecture Series, Perimeter Institute, Waterloo, Ontario, Canada, May 9, 2010.

- **Locality Non-contextuality and Free Will in Modal Quantum Theory , Conceptual Foundations and Foils for Quantum Information Processing, Perimeter Institute, Waterloo, Ontario, Canada, May 9, 2011.**

- **Tutorial in Quantum Mechanics, Science of Information Summer School, Center for Science of Information, Purdue University, May 27, 2011**

- **Possibility, Probability and Entanglement: Non-contextuality in Modal Quantum Mechanics, Foundations of Probability and Physics - 6, Linnaeus University, Vaxjo Sweden, June 16, 2011**

- **Almost Quantum Theory, Centre for Quantum Information and Foundations Seminar series, University of Cambridge, Cambridge, England, June 29 2011**

- **Quantum Behavior in Finite Vector Spaces, Ohio Colleges Speaker's Circuit, Oberlin College, November 8, 2011.**

- **Almost Quantum Theory, Invited Lecture, Workshop on Quantum Foundations in the Light of Quantum Information III, Centre de recherches mathematiques, Montreal, Canada, December 9, 2011.**

- **Quantum Information in Non-physics Departments at Liberal Arts Colleges, Invited Lecture, American Physical Society March Meeting 2012, Boston, Massachusetts, February 27, 2012.**

- **Why Axioms? Denison Scientific Association, October 3, 2012.**

- **Why Axioms? Physics Colloquium Series, Kenyon College, Gambier, Ohio, February 22, 2012.**

- **Why Axioms? Ohio Colleges Speaker's Circuit, Ohio Wesleyan University, December 3, 2012.**

Professional Organizations

- The American Mathematical Society (AMS).

- The American Physical Society (APS).

- Sigma Pi Sigma (Physics Honorary Society).

- Pi Mu Epsilon (Mathematics Honorary Society).

- Sigma Xi (Scientific Research Honorary Society).