

# Nathaniel Johnston

University of Guelph  
Guelph, Ontario, Canada

June 14, 2011

njohns01@uoguelph.ca  
www.nathanieljohnston.com

## Education

- **University of Guelph** Guelph, ON  
*Ph.D. Mathematics (in progress)* 2008 – present
  - Advisor: David W. Kribs
  - Relevant courses: Matrix Analysis at University of Houston (Houston, TX), Quantum Information Theory
- **University of Guelph** Guelph, ON  
*M.Sc. Mathematics* 2007 – 2008
  - Advisors: John Holbrook and David W. Kribs
  - Thesis: Stabilized Distance Measures and Quantum Error Correction
  - Graduated with a 98.3% average
  - Relevant courses: Operator Algebras at Fields Institute (Toronto, ON), Quantum Information Theory at University of Waterloo (Waterloo, ON)
- **University of Guelph** Guelph, ON  
*B.A.H. Mathematics* 2003 – 2007
  - Graduated with a Major in Mathematics and a Minor in Statistics
  - Graduated with Honours, a 98.6% cumulative average, and Dean’s Honour List each year
  - Relevant courses: Functional Analysis, Operations Research, Quantum Error Correction

## Awards, Grants & Honours

NSERC Canada Graduate Scholarship (CGS D) (\$35 000)	2008 – 2011
Brock Doctoral Scholarship (\$30 000)	2008 – 2011
Ontario Graduate Scholarship (OGS) (\$15 000, declined)	2008
Mathematics Graduate Scholarship (\$500)	2008
NSERC Canada Graduate Scholarship (CGS M) (\$17 500)	2007
Ontario Graduate Scholarship (OGS) (\$15 000, declined)	2007
Governor General’s Academic Silver Medal	2007
Mathematics Graduation Prize (\$250)	2007
College of Physical and Engineering Sciences Graduation Prize (\$250)	2007
NSERC Undergraduate Student Research Award (\$5 625)	2007
Class of 1970 Scholarship (\$1 400)	2006
Moffat Mathematics & Statistics Award (\$900)	2006
NSERC Undergraduate Student Research Award (\$5 625)	2006
Dean’s Scholarship (\$1 000)	2005
Moffat Mathematics & Statistics Award (\$900)	2005
Dean’s Scholarship (\$1 000)	2004
Ted Newton Memorial Scholarship (\$1 500)	2004
WebCT Conferencing Prize (\$250)	2004
Board of Governors’ Scholarship (\$2 000)	2003 – 2006
University of Guelph Entrance Scholarship (\$2 000)	2003

## Teaching Experience

- **Set Theory (MATH\*2000)** University of Guelph  
*Sessional Lecturer* Fall 2010
  - Created assignments, examinations, and taught the course.
  - Received a 4.62 student evaluation (on a 1 to 5 scale).
- **Calculus (MATH\*1210)** University of Guelph  
*Teaching Assistant* Winter 2010
  - Led weekly labs guiding students through difficult problems.
- **Set Theory (MATH\*2000)** University of Guelph  
*Teaching Assistant* Fall 2006, Fall 2007
  - Led seminars guiding students through difficult problems and reviewing course material.
- **Math Help Desk** University of Guelph  
*Teaching Assistant* Sept. 2005 – present
  - Provided one-on-one and group tutoring to students in first and second year math courses.

## Publications (available at [www.nathanieljohnston.com/publications](http://www.nathanieljohnston.com/publications))

- 1) N. Johnston and E. Størmer, *Mapping Cones are Operator Systems*. Preprint (2011). E-print: arXiv:1102.2012 [math.OA]
- 2) N. Johnston and D. W. Kribs, *Quantum Gate Fidelity in Terms of Choi Matrices*. Preprint (2011). E-print: arXiv:1102.0948 [quant-ph]
- 3) N. Johnston, *Characterizing Operations Preserving Separability Measures via Linear Preserver Problems*. To appear in *Linear and Multilinear Algebra* (2011). E-print: arXiv:1008.3633 [quant-ph]
- 4) N. Johnston, D. W. Kribs, V. I. Paulsen, and R. Pereira, *Minimal and Maximal Operator Spaces and Operator Systems in Entanglement Theory*. *Journal of Functional Analysis* **260** 8, 2407–2423 (2011).
- 5) N. Johnston and D. W. Kribs, *A Family of Norms With Applications in Quantum Information Theory II*. *Quantum Information & Computation* **11** 1 & 2, 104–123 (2011).
- 6) N. Johnston and D. W. Kribs, *Generalized Multiplicative Domains and Quantum Error Correction*. *Proceedings of the American Mathematical Society* **139**, 627–639 (2011).
- 7) N. Johnston, *The B36/S125 “ $2 \times 2$ ” Life-Like Cellular Automaton*. In *Game of Life Cellular Automata* chapter 7, A. Adamatzky, Springer-UK, 99–114 (2010).
- 8) N. Johnston and D. W. Kribs, *Schmidt Operator Norms and Entanglement Theory*. Fourth International Conference on Quantum, Nano and Micro Technologies, 92–95 (2010).
  - Selected as one of the best papers of the conference.
- 9) N. Johnston and D. W. Kribs, *A Family of Norms With Applications in Quantum Information Theory*. *Journal of Mathematical Physics* **51**, 082202 (2010).
  - Selected for the Virtual Journal of Quantum Information.
- 10) M.-D. Choi, N. Johnston, and D. W. Kribs, *The Multiplicative Domain in Quantum Error Correction*. *Journal of Physics A: Mathematical and Theoretical* **42**, 245303 (2009).

- 11) N. Johnston, D. W. Kribs, and V. I. Paulsen, *Computing Stabilized Norms for Quantum Operations*. Quantum Information & Computation **9** 1 & 2, 16–35 (2009).
- 12) N. Johnston, D. W. Kribs, and C.-W. Teng, *An Operator Algebraic Formulation of the Stabilizer Formalism for Quantum Error Correction*. Acta Applicandae **108** 3, 687–696 (2009).

## Presentations

- *Quantum Gate Fidelity in Terms of Choi Matrices*
  - Tuesday Theory Lunch – Institute for Quantum Computing, Waterloo, Ontario (March 2011).
  - Quantum Information & Geometric Statistics Seminar (QuIGS) – University of Guelph, Guelph, Ontario (March 2011).
- *Applications of a Family of Norms in Entanglement Theory*
  - Institute for Quantum Information Science Seminar (IQIS) – University of Calgary, Calgary, Alberta (February 2011).
- *Minimal and Maximal Operator Spaces and Operator Systems in Entanglement Theory*
  - 14th Workshop on Quantum Information Processing (Poster) – Sentosa, Singapore (January 2011).
  - Quantum Information & Geometric Statistics Seminar (QuIGS) – University of Guelph, Guelph, Ontario (November 2010).
- *Linear Preserver Problems in Quantum Information Theory*
  - Quantum Information & Geometric Statistics Seminar (QuIGS) – University of Guelph, Guelph, Ontario (October 2010).
- *Schmidt Norms for Quantum States*
  - Quantum Computation & Information Group Seminar – University of Bristol, Bristol, United Kingdom (May 2010).
  - Tuesday Theory Lunch – Institute for Quantum Computing, Waterloo, Ontario (December 2009).
  - Quantum Information & Geometric Statistics Seminar (QuIGS) – University of Guelph, Guelph, Ontario (November 2009).
- *The Multiplicative Domain in Quantum Error Correction*
  - Canadian Quantum Information Student Conference – Toronto, Ontario (August 2009).
  - 4th Workshop on Theory of Quantum Computation, Communication and Cryptography (Poster) – Waterloo, Ontario (May 2009).
  - Canadian Mathematical Society Winter 2008 Meeting – Ottawa, Ontario (December 2008).
  - Quantum Information & Geometric Statistics Seminar (QuIGS) – University of Guelph, Guelph, Ontario (July 2008).
- *Completely Bounded Norms in Quantum Information*

- Quantum Information & Geometric Statistics Seminar (QuIGS) – University of Guelph (August 2007).

## Participation in Workshops and Conferences

- **14th Workshop on Quantum Information Processing** Sentosa, Singapore  
*Centre for Quantum Technologies* January 10 – 14, 2011
- **Heilbronn Quantum Algorithms Day** Bristol, United Kingdom  
*University of Bristol* May 18, 2010
- **Canadian Q.I. Student Conference (co-organizer)** Toronto, ON  
*Fields Institute* August 22 – 23, 2009
- **Workshop on Operator Structures in Quantum Information** Toronto, ON  
*Fields Institute* July 6 – 10, 2009
- **Workshop on Trends and Developments in Linear Algebra** Trieste, Italy  
*International Centre for Theoretical Physics* June 22 – 26, 2009
- **4th Workshop on Theory of Quantum Computation** Waterloo, ON  
*Institute for Quantum Computing* May 11 – 13, 2009
- **Canadian Mathematical Society Winter 2008 Meeting** Ottawa, ON  
*Carleton University* December 4 – 6, 2008
- **36th Canadian Operator Symposium** Toronto, ON  
*Fields Institute* May 20 – 24, 2008
- **Workshop on Noncommutative Dynamics and Applications** Toronto, ON  
*Fields Institute* July 16 – 20, 2007
- **35th Canadian Operator Symposium** Guelph, ON  
*University of Guelph* June 5 – 9, 2007
- **Seventh Canadian Summer School on Quantum Information** Waterloo, ON  
*Institute for Quantum Computing* May 27 – 31, 2007

## Other Research Experience

- **NSERC Undergraduate Student Research Award** University of Guelph  
*Quantum Computing* May 2007 – Aug. 2007
  - Searched for new methods of quantum error correction.
  - Implemented an algorithm for estimating the completely bounded norm of linear maps.
- **NSERC Undergraduate Student Research Award** University of Guelph  
*Quantum Computing* May 2006 – Aug. 2006
  - Searched for new methods of quantum error correction.

## Academic Service and Contributions

- Refereed papers for the following journals:
  - Linear Algebra and its Applications

– Quantum Information Processing

- Editor-in-Chief of the **On-Line Encyclopedia of Integer Sequences**.  
*April 2011 – present*
- Student representative for the University of Guelph Department of Mathematics & Statistics **Graduate Committee**.  
*September 2010 – present*
- Creator and maintainer of **ConwayLife.com**, a widely used tool for exploring Conway’s Game of Life and an online encyclopedia containing over 950 articles about cellular automata.  
*January 2009 – present*
- Language Editor for the **Central European Journal of Mathematics**.  
*December 2008 – present*
- Ontario Representative of the **Canadian Mathematical Society Student Committee**.  
*October 2008 – June 2010*