Nathaniel Johnston

September 20, 2011

University of Guelph

njohns01@uoguelph.ca

Guelph, Ontario, Canada

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)

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 × 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