

Christopher Martin van Bommel

CONTACT INFORMATION

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EDUCATION

University of Waterloo, Waterloo, Ontario

Ph.D., Combinatorics and Optimization September 2015 - August 2019
Dissertation: Quantum Walks and Pretty Good State Transfer on Paths
Supervisor: Chris Godsil

Certificate in University Teaching
Research Topic: Mathematical Proofs 101: How Proofs Should Be Read, Written, and Taught

University of Victoria, Victoria, British Columbia

M.Sc., Mathematics September 2013 - April 2015
Thesis: An Asymptotic Existence Theory on Incomplete Mutually Orthogonal Latin Squares
Supervisor: Peter Dukes

St. Francis Xavier University, Antigonish, Nova Scotia

B.Sc., Mathematics, with First Class Honours September 2009 - April 2013
Honours Thesis: Vertex Colouring Problems with Restrictions Given by Faces
Supervisor: Stephen Finbow

RESEARCH INTERESTS

Quantum Walks, Graph Colouring, Random Graphs, Graph Searching, and Combinatorial Designs

PUBLICATIONS

- [1] Finbow, S., MacIssac, R., van Bommel, C.M. A note on the existence of infinite sequences of γ -graphs of graphs. Submitted to *Discrete Applied Mathematics*.
- [2] Finbow, S., van Bommel, C.M. γ -graphs of trees. Special Issue: Papers Commemorating the Fiftieth Southeastern International Conference on Combinatorics, Graph Theory, and Computing (SEICCGTC 2019). *Algorithms* 12(8) (2019), 153.
- [3] van Bommel, C.M. A complete characterization of pretty good state transfer on paths. *Quantum Information and Computation*. 19 (2019), 601–608.
- [4] Coutinho, G., Guo, K., van Bommel, C.M. Pretty good state transfer between internal nodes of paths. *Quantum Information and Computation*. 17 (2017), 825–830.
- [5] Mynhardt, C.M., van Bommel, C.M. Triangle decompositions of planar graphs. *Discussiones Mathematicae Graph Theory* 36 (2016), 643–659.
- [6] van Bommel, C.M., van Bommel, M.F. Eternal domination numbers of $5 \times n$ grid graphs. *Journal of Combinatorial Mathematics and Combinatorial Computing* 97 (2016), 83–102.
- [7] van Bommel, C.M., Gorzny, J. Exact values for the ϵ -ascent chromatic index of complete graphs. *Journal of Combinatorial Mathematics and Combinatorial Computing* 97 (2016), 227–240.
- [8] Finbow, S., van Bommel, C.M. Planar triangulations and equality in the domination chain. *Discrete Applied Mathematics* 194 (2015), 81–92.
- [9] Dukes, P.J., van Bommel, C.M. Mutually orthogonal latin squares with large holes. *Journal of Statistical Planning and Inference* 159 (2015), 81–89.
- [10] Kolen-Thompson, A.M., Wadsworth, L.A., Wang, X., van Bommel, C.M., Terrio, C.A. (2013). Measuring physical activity in children and youth: Learning from experience, in P.S. de Brito André & H. Varnum (eds). *Accelerometers: Principles, Structure and Applications*, Nova Science Publishers. ebook pp 245–269.
- [11] Beaton, I., Begin, R., Finbow, S., van Bommel, C.M. Even time constraints on the watchman’s walk problem. *The Australasian Journal of Combinatorics* 56 (2013), 113–122.
- [12] Finbow, S., Marchand, D., van Bommel, C.M., Yu, B. Equality throughout the domination chain. *Ars Combinatoria*. (Accepted November 2012)

Invited Conference Presentations:

- [1] van Bommel, C.M. (2019) **Quantum Walks, State Transfer, and Modified Paths**. 2019 CMS Winter Meeting: Quantum Information on Graphs Session, Toronto.
- [2] van Bommel, C.M. (2018) **Pretty Good State Transfer on Paths**. AMS Spring Eastern Sectional Meeting: Special Session on Extremal Graph Theory and Quantum Walks on Graphs, Northeastern University.
- [3] van Bommel, C.M. (2017) **Characterizing Pretty Good State Transfer on Paths**. CanaDAM 2017: Algebraic Graph Theory in Quantum Computing Contributed Minisymposium, Ryerson University.
- [4] van Bommel, C.M. (2015) **Triangle Decompositions of Planar Graphs**. 3rd BC Combinatorics Day, University of Victoria.

Contributed Conference Presentations:

- [5] van Bommel, C.M. (2019) **Multiple Qubit State Transfer on Paths**. 14th East Coast Combinatorics Conference, St. Francis Xavier University.
- [6] van Bommel, C.M. (2019) **Quantum Walks, State Transfer, and Entanglement**. CanaDAM 2019, Simon Fraser University.
- [7] van Bommel, C.M., Finbow, S. (2015) **Gamma Graphs of Trees**. 10th East Coast Combinatorics Conference, Mount Allison University.
- [8] van Bommel, C.M. (2015) **Mutually Orthogonal Latin Squares with Large Holes**. 2015 CMS Summer Meeting: AARMS-CMS Student Poster Session, University of Prince Edward Island.
- [9] van Bommel, C.M., Dukes, P.J. (2014) **Mutually Orthogonal Latin Squares with Large Holes**. 28th Midwest Conference on Combinatorics and Combinatorial Computing, University of Nevada Las Vegas.
- [10] van Bommel, C.M. (2013) **An Extension of Parity Vertex Colourings**. CanaDAM 2013, Memorial University of Newfoundland.
- [11] van Bommel, C.M., Kolen-Thompson, A.M., Wadsworth, L.A., Wang, X. (2013) **Keeping Pace: Comparing Active, Moderately Active, and Inactive Children and Youth**. 41st Annual Meeting of the Statistical Society of Canada: Inaugural Student Conference, University of Alberta.
- [12] van Bommel, C.M., Finbow, S. (2012) **Planar Triangulations and the Domination Chain**. Science Atlantic Mathematics, Statistics, and Computer Science Conference, Mt. Allison University.
- [13] van Bommel, C.M., Thompson, A.M., Wadsworth, L.A., Wang, X. (2012) **Keeping Pace: The 2009 Survey of Physical Activity and Dietary Intake of Nova Scotia Children and Youth**. 40th Annual Meeting of the Statistical Society of Canada, University of Guelph.
- [14] van Bommel, C.M., Begin, R., Finbow, S. (2011) **Gamma Graphs of Graphs**. Science Atlantic Mathematics, Statistics, and Computer Science Conference Conference, St. Francis Xavier University.
- [15] van Bommel, C.M., Beaton, I., Begin, R., Finbow, S. (2010) **Even Time Constraints on the Watchman's Walk Problem**. APICS Mathematics, Statistics, and Computer Science Conference Conference, St. Mary's University.

FUNDING AND AWARDS

Doctoral Thesis Completion Award, Spring 2019, \$5000

NSERC Alexander Graham Bell Canada Graduate Scholarship, September 2015 - August 2018, \$105 000

President's Graduate Scholarship, University of Waterloo, September 2015 - August 2018, \$30 000

C and O Entrance Award, University of Waterloo, Fall 2015, \$5000

UVic Fellowship, September 2014 - April 2015, \$10 000

NSERC André Hamer Postgraduate Prize, September 2013 - August 2014, \$10 000

Julie Payette-NSERC Research Scholarship, September 2013 - August 2014, \$25 000

UVic President's Research Scholarship, September 2013 - August 2014, \$4000

NSERC Undergraduate Student Research Award, Summer 2012, \$6650
 NSERC Undergraduate Student Research Award, Summer 2011, \$6650
 NSERC Undergraduate Student Research Award, Summer 2010, \$6400
 Canadian Scholarship, St. Francis Xavier University, September 2009 - April 2013, \$24 000

RESEARCH
EXPERIENCE

University of Waterloo, Waterloo, Ontario
Visiting Scholar September 2019 - Present

St. Francis Xavier University, Antigonish, Nova Scotia
Graduate Student Research Assistant May 2015 - September 2015
 Continuing projects started as an (Undergraduate) Student Research Assistant.

Student Research Assistant July 2015 - September 2015
 Revising and completing a paper based on my work on the Keeping Pace Project.

Keeping Pace Project Data Analyst June 2011 - August 2013
 Determining and applying methods to analyze complex survey data.

Student Research Assistant June 2009 - August 2012

- Study of well-dominated and well-irredundant graphs and vertex colourings. April 2012 - August 2012
- Study of Gamma Graphs of Graphs. May 2011 - August 2011
- Continued study of the Watchman's Walk Problem. April 2010 - August 2010
- Study of the Watchman's Walk Problem. June 2009 - August 2009

SCHOOLS ATTENDED

- Summer School on Random Graphs and Probabilistic Methods, Fields Institute June 2017
- Cargèse Fall School on Random Graphs, Institut d'Études Scientifiques de Cargèse September 2015
- Pacific Institute for the Mathematical Sciences Applied Combinatorics Summer School, University of Saskatchewan May 2015
- Atlantic Association for Research in the Mathematical Sciences Summer School, Memorial University of Newfoundland (MATH 6341: Combinatorial Designs and Graph Decompositions & MATH 6345: Probabilistic Method and Random Graphs) August 2012

TEACHING
EXPERIENCE

University of Toronto Mississauga, Mississauga, Ontario
Mathematics and Numeracy Instructor October 2019 - Present
 Drop-in sessions providing one-on-one instruction in mathematics and development of tip sheets on math skills required for first and second year courses.

Sessional Instructional Assistant September 2019 - Present
 Tutorial teaching and preparation, office hours for student questions, marking of tests and exams, invigilation of tests and exams.

University of Waterloo, Waterloo, Ontario
Lecturer May 2018 - August 2018
 MATH 136 - Linear Algebra 1 for Honours Mathematics Enrolment: 25
 Systems of linear equations, matrix algebra, elementary matrices, computational issues. Real n -space, vector spaces and subspaces, basis and dimension, rank of a matrix, linear transformations and matrix representations. Determinants, eigenvalues and diagonalization, applications.

Teaching Assistant September 2015 - April 2019
 In Fall 2018, I was a head TA, and designed tutorials based on problems suggested from other TAs, kept track of TA hours and duties, released student assignments from Crowdmark and transferred the grades to Learn, handled remarking re-quests from students, and answered student queries on Piazza. In other terms, my responsibilities include instructing tutorials, working in the Tutorial

Centre, collecting, grading, and returning assignments, entering grades, and proctoring and marking the midterm and final. Courses include introductory courses to combinatorics, an upper year / graduate graph theory course, and two courses for the Masters of Mathematics for Teachers program.

University of Victoria, Victoria, British Columbia

Teaching Assistant

September 2013 - April 2015

Various responsibilities including marking assignments and midterms, instructing tutorials, invigilating tests, and working in the Assistance Centre, which provides one-on-one tutoring to students in first or second year Mathematics or Statistics courses. Courses include first year calculus, an introductory course in abstract algebra, precalculus, and an upper year applied algebra course.

St. Francis Xavier University, Antigonish, Nova Scotia

Teaching Assistant

September 2010 - April 2013

Responsibilities including working in the Math Learning Centre, which provides individual assistance to students in first and second year Mathematics and Statistics courses, and marking labs, assignments, and quizzes for second year courses.

Math Tutorials Volunteer

January 2011 - April 2013

Assisted students in first and second year Mathematics and Statistics courses as part of the Tuesday Night Tutorials provided by the Mathematics, Statistics, and Computer Science Society.

Private Tutor

February 2010 - December 2012

First and second year mathematics and physics courses.

PROFESSIONAL
DEVELOPMENT

- Graduate Teaching Seminar, Faculty of Mathematics, University of Waterloo Winter 2019
- Speak Like a Scholar, University of Waterloo October 2018
- LGBTQ+ Making Spaces Workshop, University of Waterloo July 2017
- Waterloo Datathon Participant May 2017
- EQuALS 2017: Excellence and Quality in Academic Life in STEM, University of Waterloo May 2017
- Fundamentals of University Teaching Program, University of Waterloo 2015-2016
- TA Fundamentals Certificate, University of Victoria April 2015

SERVICE

University of Waterloo Graduate Student Association, Waterloo, Ontario

Councillor

October 2016 - August 2019

Representative for the Department of Combinatorics and Optimization on the Council, the social, political, and academic body of the Association.

Speaker of the Council

May 2018 - April 2019

Chair of the Council.

Committee Member

- Joint Policy Review Committee May 2018 - April 2019
- Council Executive Committee May 2017 - April 2019
- Presidential Nominating Committee January 2019 - March 2019
- VP Hiring Committee August 2018
- Council Reform Working Group January 2018 - March 2018
- Strategic Planning Committee February 2017 - April 2017
- Social Advisory Committee October 2016 - April 2017

University of Waterloo, Waterloo, Ontario

Convocation Volunteer

June 2018 - June 2019

Worked as an Assistant Marshall during Convocation ceremonies.

CEMC Contest Marker

December 2018 & May 2019

Assisted in marking The Centre for Education in Mathematics and Computing high school mathematics competition papers.

- Graduate Student Relations Committee** May 2018 - April 2019
As a graduate student representative, communicate with senior University officials, and have a responsibility for student relations and addressing matters of concern relating to University-student relations and student life.
- Graduate Student Support Advisory Committee** November 2017 - April 2019
As a graduate student representative, worked as part of the committee to prepare a recommendation to the provost on increases to minimum PhD funding, TA rates, and RA rates.
- Canadian Mathematical Society Winter Meeting Volunteer** December 2017
Ensured the audio-video equipment was set up for presentations.
- LaTeX Writing Workshop Volunteer** November 2017
Provided troubleshooting assistance to participants running into problems during the workshop.
- Graduate Student Live Chat Volunteer** July 2017
Answered questions from incoming graduate students.
- University of Victoria**, Victoria, British Columbia
- CUPE 4163 Component 1 Bargaining Committee Member** October 2014 - April 2015
Representative at the bargaining table for the UVic Educational Employees' Union.
- CUPE 4163 Component 1 Member at Large** March 2014 - March 2015
Executive member of the UVic Educational Employees' Union.
- Math Mania Volunteer** November 2014
Presenting interactive mathematics demonstrations to elementary school children.
- St. Francis Xavier University**, Antigonish, Nova Scotia
- Nova Scotia Math League Regional Coordinator** February 2012 - April 2012
Running the Antigonish centre competitions in which teams of three to four high school students compete in a three hour mathematics problem solving competition. Responsibilities involved preparing, securing financing, recruiting volunteers, and hosting.
- Nova Scotia Math League Volunteer** October 2009 - April 2011
Assisting at the Antigonish centre competitions.