

## Hanmeng (Harmony) Zhan

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CONTACT INFORMATION Centre de Recherches Mathématiques zhanhanm@crm.umontreal.ca  
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RESEARCH INTERESTS Algebraic Graph theory, Orthogonal Polynomials, Quantum Walks, Quantum Information, Equiangular Lines

CURRENT POSITION **Centre de Recherches Mathématiques**, Montréal, QC, Canada Oct 2018 - Present

- Postdoctoral Fellow  
Supervisor: Luc Vinet

EDUCATION **University of Waterloo**, Waterloo, ON, Canada

- Ph.D. May 2014 - Sept 2018  
Department of Combinatorics and Optimization, Faculty of Mathematics  
Thesis: *Discrete Quantum Walks on Graphs and Digraphs*  
Supervisor: Chris Godsil
- Master of Mathematics Sept 2012 - Apr 2014  
Department of Combinatorics and Optimization, Faculty of Mathematics  
Thesis: *Uniform Mixing on Cayley Graphs over  $\mathbb{Z}_3^d$*   
Supervisor: Chris Godsil
- Bachelor of Arts Jan 2010 - Aug 2012  
Department of Economics, Faculty of Arts  
Thesis: *Second-Price Auction with Resale*  
Supervisor: Philip Curry

**Xiamen University**, Xiamen, Fujian, China

- Bachelor of Economics Sept 2008 - Jun 2014  
Department of Statistics, Faculty of Economics  
Thesis: *Multi-Player Multi-State Quantum Games*  
Supervisor: Zhengming Qian

### PUBLICATIONS **Journal Publications**

1. A. Chan, G. Coutinho, C. Tamon, L. Vinet, H. Zhan, *Quantum Fractional Revival on Graphs*. arXiv:1801.09654 (2018). Accepted to Discrete Applied Mathematics.
2. G. Coutinho, C. Godsil, K. Guo, H. Zhan, *A New Perspective on the Average Mixing Matrix*. Electronic Journal of Combinatorics (2018) 25(4): P4.14.
3. C. Godsil, H. Zhan, *Uniform Mixing on Cayley Graphs*. Electronic Journal of Combinatorics (2017) 24(3): P3.20.
4. G. Coutinho, C. Godsil, M. Shirazi, H. Zhan, *Equiangular Lines and Covers of the Complete Graph*. *Equiangular Lines and Covers of the Complete Graph*. Linear Algebra and its Applications (2016) 488: 264-283.

5. R. Alvir, S. Dever, B. Lovitz, J. Myer, C. Tamon, Y. Xu, H. Zhan. *Perfect State Transfer in Laplacian Quantum Walk*. Journal of Algebraic Combinatorics (2016) 43(4): 801-826.

### Preprints

6. C. Godsil, H. Zhan, *Discrete-Time Quantum Walks and Graph Structures*. arXiv:1701.04474 (2017). Submitted.
7. H. Zhan, *An Infinite Family of Circulant Graphs with Perfect State Transfer in Discrete Quantum Walks*. arXiv:1707.06703 (2017). Submitted.
8. H. Zhan, *Quantum Walks on Embeddings*. arXiv:1711.08831 (2017).

### In Preparation

9. A. Chan, G. Coutinho, C. Tamon, L. Vinet, H. Zhan, *Quantum Fractional Revival in Hamming Schemes* (2018+).

### PRESENTATIONS **Invited Talks**

1. *Some Open Problems in Discrete Quantum Walks*. In: Algebraic Graph Theory and Quantum Walks, University of Waterloo, Waterloo, ON, Canada, April 23 - 27, 2018.
2. *Recent Progress in Discrete Quantum Walks*. In: AMS Sectional Meeting, Northeastern University, Boston, MA, United States, April 21 - 22, 2018, 2018.
3. *Graph covers and equiangular frames*. In: AMS Sectional Meeting, Ohio State University, Columbus, OH, United States, March 16 - 18, 2018.
4. *From Covers to Tight Frames*. In: AMS Sectional Meeting, College of Charleston, Charleston, SC, United States, March 10 - 12, 2017.
5. *Spectra of Discrete Quantum Walks*. In: CMS Summer Meeting, University of Alberta, Edmonton, AB, Canada, June 24 - 27, 2016.
6. *Lines and Covers of Complete Graphs 2*. In: Systems of Lines: Applications of Algebraic Combinatorics, Worcester Polytechnic Institute, Worcester, MA, United States, August 10 - 14, 2015.
7. *Some Open Problems in Uniform Mixing*. In: Summer Research Program, Clarkson University, Potsdam, NY, United States, July 20, 2015.

### Conference Talks

1. *Combinatorial Aspects of Quantum walks*. In: Prairie Discrete Math Workshop, Brandon University, Brandon, MB, June 12 - 15, 2018.
2. *Discrete-Time Quantum Walks and Graph Embeddings*. In: CMS Winter Meeting, University of Waterloo, Waterloo, ON, Canada, December 8 - 11, 2017.
3. *Quantum Walks and Mixing*. In: Algebraic and Extremal Graph Theory, University of Delaware, Newark, DE, United States, August 7 - 10, 2017.
4. *Discrete-Time Quantum Walks and Graph Structures*. In: Canadian Discrete and Algorithmic Mathematics Conference, Ryerson University, Toronto, ON, Canada, June 12 - 15, 2017.
5. *Uniform Mixing in Quantum Walks*. In: 22nd Ontario Combinatorics Workshop, York University, Toronto, ON, Canada, May 16 - 17, 2014.

RESEARCH  
EXPERIENCE

**University of Waterloo**

- Graduate Research Assistant 2014 – 2016  
Conducted mathematical experiments on continuous and discrete quantum walks, and maintained a website of useful data on average mixing, periodic vertices and strongly cospectral vertices

TEACHING  
EXPERIENCE

**University of Waterloo**

- Instructor Winter 2018  
MATH 135: Algebra for Honors Mathematics
- Substitute Instructor Winter 2017  
CO 444/644: Algebraic Graph Theory
- Teaching Assistant 2012 – 2017  
Algebraic Enumeration, Algebraic Graph Theory, Calculus, Coding Theory, Introduction to Graph Theory, Graph Theory, Introduction to Combinatorics, Linear Algebra, Portfolio Optimization Models, Special Topics in Mathematical Connections

SERVICE

**Journal Reviewer**

- Discrete Mathematics
- Linear Algebra and Its Applications
- Electronic Journal of Combinatorics
- ICALP

AWARDS AND  
DISTICTIONS

**University of Waterloo**

- Outstanding Achievement in Graduate Studies 2015
- Cotton Family Women in Mathematics Graduate Scholarship 2014, 2016, 2017
- Faculty of Arts Upper-Year Scholarship 2011-2012
- Robin K. Banks Scholarship 2011-2012
- Dean's Honours List 2011-2012