Hanmeng (Harmony) Zhan

CONTACT INFORMATION

Centre de Recherches Mathématiques
Université de Montréal, P.O. Box 6128
Centre-ville Station, Montréal, QC, H3C 3J7

zhanhanm@crm.umontreal.ca
514-343-7501
hanmengzhan.com

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*. Discrete Applied Mathematics (2019), https://doi.org/10.1016/j.dam.2018.12.017.
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 maintaned 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

Seminar Organizer

- Algebraic Graph Theory Seminar — Spring 2016, Fall 2017

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