

Hanmeng (Harmony) Zhan

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PUBLICATIONS **Journal Publications**

1. H. Zhan, *An infinite family of circulant graphs with perfect state transfer in discrete quantum walks*. Quantum Information Processing (2019) 18(12): pp. 369.
2. G. Coutinho, L. Vinet, H. Zhan, A. Zhedanov. *Perfect state transfer in a spin chain without mirror symmetry*. Journal of Physics A: Mathematical and Theoretical 52(45) (2019), pp. 455302.
3. C. Godsil, H. Zhan, *Discrete-time quantum walks and graph structures*. Journal of Combinatorial Theory, Series A (2019), pp. 181212.
4. A. Chan, G. Coutinho, C. Tamon, L. Vinet, H. Zhan, *Quantum fractional revival on graphs*. Discrete Applied Mathematics (2019) 269, pp. 86-98.
5. 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.
6. C. Godsil, H. Zhan, *Uniform mixing on Cayley graphs*. Electronic Journal of Combinatorics (2017) 24(3): P3.20.
7. G. Coutinho, C. Godsil, M. Shirazi, H. Zhan, *Equiangular lines and covers of the complete graph*. Linear Algebra and its Applications (2016) 488: pp. 264-283.
8. 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): pp. 801-826.

Preprints

9. A. Chan, G. Coutinho, C. Tamon, L. Vinet, H. Zhan, *Fractional revival and association schemes*. arXiv:1907.04729 (2019). Submitted.
10. L. Vinet, H. Zhan, *Perfect state transfer on weighted graphs of the Johnson scheme*. arXiv:1904.08838 (2019). Submitted.
11. H. Zhan, *Quantum walks on embeddings*. arXiv:1711.08831 (2017). Submitted.

Book in Preparation

12. C. Godsil, H. Zhan, *Discrete Quantum Walks*.

PRESENTATIONS **Invited Talks**

1. *State transfer via orthogonal polynomials*. In: AMS Sectional Meeting, University of Wisconsin-Madison, Madison, WI, United States, September 14 - 15, 2019.
2. *Quantum state transfer in the algebra of the Johnson scheme*. In: CMS Summer Meeting, University of Regina, Regina, SK, Canada, June 7 - 10, 2019.
3. *Some elegant results in algebraic graph theory*. In: Canadian Discrete and Algorithmic Mathematics Conference, Simon Fraser University, Vancouver, BC, Canada, May 28 - 31, 2019.
4. *Quantum walks, orthogonal polynomials, and spectral graph theory*. In: Quantum Walks and Information Tasks, Banff International Research Station for Mathematical Innovation and Discovery, Banff, AB, Canada, April 21 - 26, 2019.

5. *Generating entanglement using quantum walks*. In: David A. Walsh Seminar Series, Clarkson University, Potsdam, NY, United States, February 8, 2019.
6. *Some open problems in discrete quantum walks*. In: Algebraic Graph Theory and Quantum Walks, University of Waterloo, Waterloo, ON, Canada, April 23 - 27, 2018.
7. *Recent progress in discrete quantum walks*. In: AMS Sectional Meeting, Northeastern University, Boston, MA, United States, April 21 - 22, 2018, 2018.
8. *Graph covers and equiangular frames*. In: AMS Sectional Meeting, Ohio State University, Columbus, OH, United States, March 16 - 18, 2018.
9. *From covers to tight frames*. In: AMS Sectional Meeting, College of Charleston, Charleston, SC, United States, March 10 - 12, 2017.
10. *Spectra of discrete quantum walks*. In: CMS Summer Meeting, University of Alberta, Edmonton, AB, Canada, June 24 - 27, 2016.
11. *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.
12. *Some open problems in uniform mixing*. In: Summer Research Program, Clarkson University, Potsdam, NY, United States, July 20, 2015.

Conference Talks

1. *Discrete quantum walks on Cayley graphs*. In: CMS Winter Meeting, York University, Toronto, ON, Canada, December 6 - 9, 2019.
2. *The vertex-face walk*. In: Finite Geometry and Extremal Combinatorics, University of Delaware, Newark, DE, United States, August 21 - 24, 2019.
3. *Combinatorial aspects of quantum walks*. In: Prairie Discrete Math Workshop, Brandon University, Brandon, MB, Canada, June 12 - 15, 2018.
4. *Discrete-time quantum walks and graph embeddings*. In: CMS Winter Meeting, University of Waterloo, Waterloo, ON, Canada, December 8 - 11, 2017.
5. *Quantum walks and mixing*. In: Algebraic and Extremal Graph Theory, University of Delaware, Newark, DE, United States, August 7 - 10, 2017.
6. *Discrete-time quantum walks and graph structures*. In: Canadian Discrete and Algorithmic Mathematics Conference, Ryerson University, Toronto, ON, Canada, June 12 - 15, 2017.
7. *Uniform mixing in quantum walks*. In: 22nd Ontario Combinatorics Workshop, York University, Toronto, ON, Canada, May 16 - 17, 2014.

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

Conference, Workshop and Seminar Organizer

- Algebraic Graph Theory and Quantum Information, Fields Institute May 4 - 8, 2020
- Quantum Information on Graphs, CMS Winter Meeting Dec 6 - 9, 2019
- Discrete Mathematics Seminar, York University Fall, 2019
- Algebraic Graph Theory Seminar, University of Waterloo Spring 2016, Fall 2017

Journal Refereeing

- Communications in Algebra
- Discrete Mathematics
- Electronic Journal of Combinatorics
- Journal of Physics A: Mathematical and Theoretical
- Linear Algebra and Its Applications
- Linear and Multilinear Algebra

Conference Refereeing

- International Colloquium on Automata, Languages and Programming
- Sampling Theory and Applications

RESEARCH EXPERIENCE

University of Waterloo

- Graduate Research Assistant 2014 – 2016
Generated data on continuous and discrete quantum walks, and created websites introducing average mixing matrices, periodic vertices and strongly cospectral vertices

AWARDS AND DISTICTIONS

University of Waterloo

- University Finalist for the Governor General's Gold Medal 2019
- First Place in the Inaugural Mathematics Doctoral Prize Competition 2019
- 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