

## **Chung Yin Amy Pang 彭頌賢**

Department of Mathematics, Hong Kong Baptist University, Kowloon, Hong Kong  
amypang@hkbu.edu.hk  
<http://www.math.hkbu.edu/~amypang>, <http://amypang.github.io/>  
British citizen, Hong Kong permanent resident

### **Research Interests:**

Symmetric functions and other combinatorial Hopf algebras, and their interaction with Markov chains.

### **Employment**

- |                |   |
|----------------|---|
| 2016 - present | Assistant Professor, Hong Kong Baptist University, Hong Kong  |
| 2014 - 2016    | CRM-ISM postdoctoral fellow, Laboratoire de Combinatoire et d'Informatique Mathématique (LaCIM), Université du Québec à Montréal (UQAM), Canada |
| 2015           | Course Lecturer (part time), McGill University, Montreal, Canada  |

### **Education**

- |      |  |
|------|--|
| 2014 | PhD in Mathematics, Stanford University, USA ( <i>Advisor: Persi Diaconis; dissertation title: Hopf Algebras and Markov Chains</i> ) |
| 2009 | Certificate of Advanced Study in Mathematics ('Part III') with distinction, Trinity Hall, University of Cambridge, UK                |
| 2008 | BA in Mathematics, Trinity Hall, University of Cambridge, UK   |

### **Research Grants**

RGC-ECS: *Markov Chains driven by Permuted and Hyperoctahedral Descent Operators on Combinatorial Hopf Algebras*, 2018-2020.

### **Publications**

- 5 (with M. Josuat-Vergès) *Subalgebras of Solomon's Descent Algebra based on Alternating Runs*, J. Combin. Theory Ser. A, accepted.
- 4 *Card-Shuffling via Convolutions of Projections on Combinatorial Hopf Algebras*, 27th Annual International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2015), 49-60, Discrete Math. Theor. Comput. Sci. Proc., Assoc. Discrete Math. Theor. Comput. Sci., Nancy, 2015
- 3 (with P. Diaconis, A. Ram) *Hopf Algebras and Markov Chains: Two Examples and a Theory*, J. Algebraic Combin., 39(3):527–585, 2014.
- 2 *A Hopf-power Markov chain on Compositions*, 25th Annual International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC

2013), 499-510, Discrete Math. Theor. Comput. Sci. Proc., AS, Assoc. Discrete Math. Theor. Comput. Sci., Nancy, 2013

- 1 (with 27 others) *Supercharacters, Symmetric Functions in Noncommuting variables, and related Hopf Algebras*, Adv. Math. 229 (2012), no. 4, 2310–2337

### ***Preprints***

*Markov Chains from Descent Operators on Combinatorial Hopf Algebras*  
arxiv.org/abs/1609.04312

*Lumpings of Algebraic Markov Chains arise from Subquotients*  
arxiv.org/abs/1508.01570

*Hopf Algebras and Markov Chains* (thesis) arxiv.org/abs/1412.8221

### ***Invited Talks***

- |                |  |
|----------------|--|
|                | <i>A Uniform Analysis of Combinatorial Markov Chains using Hopf Algebras,</i>  |
| October 2016   | Department of Stat. Seminar, Chinese University of Hong Kong   |
| January 2016   | Department of Math. Colloquium, Hong Kong Baptist University   |
| January 2016   | Numerical Methods and Applied Analysis Seminar, University of Hong Kong  |
| October 2015   | <i>A Hopf-Algebraic Lift of the Down-Up Markov Chain on Partitions to Permutations</i> , Special Session on Hopf Algebraic Combinatorics, AMS Sectional Meeting, Chicago, USA. |
|                | <i>Card Shuffling and Convolutions of Projections on graded Hopf Algebras,</i>   |
| January 2015   | Applied Algebra Seminar, York University   |
| September 2014 | Combinatorics Seminar, LaCIM   |
| December 2014  | <i>Card Shuffling, Tree-Pruning and Convolutions of Projections on graded Hopf Algebras</i> , CRM-ISM Probability Seminar  |
|                | <i>Card Shuffling and other Hopf-Power Markov Chains,</i>  |
| June 2014      | Combinatorics Seminar, LaCIM   |
| January 2014   | Combinatorics Seminar, University of Michigan  |
| August 2013    | Algebra/Geometry/Topology Seminar, University of Melbourne   |
| March 2013     | Algebra and Combinatorics Seminar, Loyola University Chicago   |
| February 2014  | <i>Markov Chains from Combinatorial Hopf Algebras</i> , Probability Seminar, Cornell University  |

### ***Other Research Presentations***

- |           |  |
|-----------|--|
| July 2015 | <i>Card-Shuffling via Convolutions of Projections on Combinatorial Hopf Algebras</i> , 27th International Conference on Formal Power Series and Algebraic Combinatorics, Daejeon, South Korea. |
|-----------|--|

- March 2015      *Card Shuffling and Markov Chains on Combinatorial Hopf Algebras*, Probability Seminar, University of Ottawa
- January 2015    *Card Shuffling and Convolutions of Projections on graded Hopf Algebras*, Combinatorial Algebra meets Algebraic Combinatorics, Kingston, Canada.
- July 2013        *A Hopf-power Markov chain on Compositions (poster)*, 25th International Conference on Formal Power Series and Algebraic Combinatorics, Paris, France.
- April 2012       *Ribbon Characters, Garsia-Reutenauer idempotents and a Biased Amazing Matrix??*, Student Probability and Related Fields Seminar, Stanford University
- May 2011        *Kolmogorov's Rock-Breaking and Related Walks on Species*, Student Probability and Related Fields Seminar, Stanford University

### ***Expository Presentations***

- March 2014      *What is a Combinatorial Hopf Algebra?* Graduate Student Colloquium, Stanford University
- May 2011        *Card Games and Crystals*, Graduate Student Colloquium, Stanford University
- April 2010       *The Art Gallery Problem*, Stanford University Mathematics Organisation Speaker Series
- October 2009    *Hopf Algebras and Representation Theory*  
Graduate Student Colloquium, Stanford University
- March 2009      Part III seminar, University of Cambridge

### ***Teaching***

*Course Lecturer at Hong Kong Baptist University:*

- 2016 - present    Math 2207, Linear Algebra  
2017 - present    Math 2205, Multivariate Calculus

*Course Lecturer at McGill University:*

- Fall 2015        Math 141, Integral Calculus

*Guest Lecturer at Université du Québec à Montréal (3 lectures):*

- Automne 2015    Mat 995B, Research Seminar on Combinatorics: Descent Algebras

*Teaching Assistant at Stanford University (leading recitations):*

- Autumn 2013    Math 41A, Accelerated Differential Calculus  
2010 - 2013    Math 51, Linear Algebra and Multivariable Calculus

*Course Assistant at Stanford University (office hours, grading):*

Autumn 2012	Math 19, Differential Calculus
Spring 2012	Math 110, Applied Number Theory and Field Theory
Winter 2011	Math 210B, Graduate Algebra
Spring 2010	Math 113, Linear Algebra and Matrix Theory
Autumn 2009	Math 120, Introduction to Abstract Algebra

*Administrative Teaching Assistant at Stanford University:*

Spring 2014	Math 51, Linear Algebra and Multivariable Calculus (200 students)
-------------	---

*Teaching Assistant at Stanford University Mathematics Camp:*

2009 - 2010	Program I, Abstract Algebra and Number Theory
-------------	---

*Teaching Assistant at Enrichment Program for Young Mathematical Talents, Chinese University of Hong Kong:*

2007	Non-Euclidean Geometry
------	------------------------

***Student Supervision***

2016 - present	Undergraduate final year projects, Hong Kong Baptist University
----------------	---

***Conference and Workshop Participation***

August 2017	3rd International Congress in Algebras and Combinatorics, Hong Kong
December 2016	Joint UM-HKBU Workshop on Mathematics and Statistics, Macau
June 2016	4th Institute of Mathematical Statistics Asia Pacific Rim Meeting, Hong Kong
December 2015	Canadian Mathematical Society Winter Meeting, Montreal, Canada
August 2015	BIRS workshop on Positivity in Algebraic Combinatorics, Banff, Canada
June 2015	SageDays65, Chicago, USA
April 2015	SageDays67, Montreal, Canada
2011 - 2014	Bay Area Discrete Mathematics Days, USA
February 2014	Lie Groups, Lie Algebras and Their Representations, Stanford, USA
January 2013	Algebraic Groups and Representation Theory - a Conference in Memory of Tonny A. Springer, Hong Kong
July 2012	24th International Conference on Formal Power Series and Algebraic Combinatorics, Nagoya, Japan

***Service, Academic***

2018 (expected) Program committee member, 28th International Conference on Formal Power Series and Algebraic Combinatorics

2014 - 2017 Journal referee, J. Alg. Combi.; J. Combin. Theory Ser. A

***Service, Departmental***

2017 Interviewer, year 3 direct entry (to HKBU math department)

2011 - 2013 Co-organiser, Stanford Women in Math

2010 - 2011 Co-organiser, Stanford Graduate Student Colloquium