

# Henry Yuen

Associate Professor (without Tenure) of Computer Science  
Columbia University

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## Research area

Quantum computing, quantum information, cryptography, complexity theory.

## Appointments held

- 2024 – Associate Professor (without Tenure), Columbia University  
Department of Computer Science
- 2021 – 2023 Assistant Professor, Columbia University  
Department of Computer Science
- 2018 – 2021 Assistant Professor, University of Toronto  
Departments of Computer Science and Mathematics (*joint appointment*)
- 2016 – 2018 Postdoctoral Associate in Computer Science, University of California, Berkeley

## Education

- 2011 – 2016 Ph.D. in Computer Science, MIT  
Thesis supervisor: Dana Moshkovitz  
Thesis title: *Games, Protocols, and Quantum Entanglement*
- 2006 – 2010 B.A. in Mathematics, University of Southern California

## Honors & Awards

- 2024 “Unitary Complexity and the Uhlmann Transformation Problem” invited as a Long Plenary Talk at *Quantum Information Processing (QIP) 2024*.

- 2024 “An efficient quantum parallel repetition theorem” invited as a Short Plenary Talk at *Quantum Information Processing (QIP) 2024*.
- 2023 “Pseudorandom Quantum States, Revisited: New Properties, Variants, Constructions and Cryptographic Applications” invited as a Short Plenary Talk at *Quantum Information Processing (QIP) 2023*.
- 2022 Sloan Research Fellow.
- 2022 NSF CAREER Award.
- 2022 “Nonlocal Games, Compression Theorems, and the Arithmetical Hierarchy” invited as a Plenary Talk at *Quantum Information Processing (QIP) 2022*.
- 2020 Simons-Berkeley Research Fellowship.
- 2017 “Multiplayer parallel repetition for expander games” Highlighted Talk at *Innovations in Theoretical Computer Science (ITCS) 2017*.
- 2016 “Anchoring games for parallel repetition” invited as a Plenary Talk at *Quantum Information Processing (QIP) 2016*.
- 2015 – 2017 Simons Graduate Fellowship for Theoretical Computer Science
- 2012 – 2015 NSF Graduate Fellowship
- 2011 MIT Presidential Fellowship

## Grants

- 2024 - 2027 NSF Small: Theoretical Foundations of Quantum Pseudorandom Primitives  
co-PI with Prabhanjan Ananth  
USD 600,000 (own share: 300,000)
- 2023 - 2025 DOE EXPRESS 2023 Grant  
co-PI with Sebastian Will and Dan Rubenstein  
USD 400,000 (own share: 133,333)
- 2023 - 2028 Air Force Office of Scientific Research Grant (Sole PI, 800,000)
- 2023 - 2025 Brookhaven National Lab grant: Hybrid Digital-Analog Quantum Algorithms  
co-PI with Sebastian Will (Columbia Physics)  
USD 140,000 (own share: 70,000)

- 2022 - 2024 Sloan Research Fellowship (Sole PI, 75,000)
- 2022 - 2027 NSF CAREER Award (Sole PI, 675,000)
- 2020 - 2023 Air Force Office of Scientific Research Grant (Sole PI, 540,000)
- 2019 Google Quantum Research Award  
Held at U. of Toronto  
co-PI with Juan Carrasquilla (Vector Institute)  
USD 100,000 (own share: 50,000)
- 2019 – 2022 NSERC Discovery Grant (Sole PI, CAD 115,000, at U. of Toronto)

## Publications

### Conference proceedings

2024

- C1. Pseudorandom Strings from Pseudorandom Quantum States.  
Prabhanjan Ananth, Yao-Ting Lin, Henry Yuen.  
In proceedings of *Innovations in Theoretical Computer Science (ITCS) 2024*.  
Available at <https://arxiv.org/abs/2306.05613>.
- C2. Unitary Complexity and the Uhlmann Transformation Problem.  
**John Bostanci**, Yuval Efron, Tony Metger, Alexander Poremba, Luowen Qian, Henry Yuen.  
Presented at *Quantum Information Processing (QIP) 2024*.  
Available at <https://arxiv.org/abs/2306.13073>.
- C3. An efficient quantum parallel repetition theorem.  
**John Bostanci**, Luowen Qian, Nick Spooner, Henry Yuen.  
In proceedings of *Symposium on Theory of Computing (STOC) 2024*.  
Presented at *Quantum Information Processing (QIP) 2024*.  
Available at <https://arxiv.org/>.
- C4. On the Pauli Spectrum of  $\text{QAC}^0$ .  
Shivam Nadimpalli, **Natalie Parham**, Francisca Vasconcelos, Henry Yuen.  
In proceedings of *Symposium on Theory of Computing (STOC) 2024*.  
Presented at *Quantum Information Processing (QIP) 2024*.  
Available at <https://arxiv.org/abs/2311.09631>.

2023

- C5. On the (Im)plausibility of Public-Key Quantum Money from Collision-Resistant Hash Functions.  
Prabhanjan Ananth, Zihan Hu, Henry Yuen.  
In proceedings of *AsiaCrypt 2023*.  
Available at <https://eprint.iacr.org/2023/069>.
- C6. stateQIP = statePSPACE.  
Tony Metger, Henry Yuen.  
In proceedings of *Foundations of Computer Science (FOCS) 2023*.  
Presented at *Quantum Information Processing (QIP) 2023*.  
Available at <https://arxiv.org/abs/2301.07730>.
- C7. Unitary property testing lower bounds by polynomials.  
**Adrian She**, Henry Yuen.  
In proceedings of *Innovations in Theoretical Computer Science (ITCS) 2023*.  
Presented at *Quantum Information Processing (QIP) 2023*.  
Available at <https://arxiv.org/abs/2210.05885>
- C8. Testing and Learning Quantum Juntas Nearly Optimally.  
**Thomas Chen, Shivam Nadimpalli**, Henry Yuen.  
In proceedings of *Symposium on Discrete Algorithms (SODA) 2023*.  
Presented at *Quantum Information Processing (QIP) 2023*.  
Available at <https://arxiv.org/abs/2207.05898>
- 2022
- C9. Pseudorandom (Function-Like) Quantum State Generators: New Definitions and Applications.  
Prabhanjan Ananth, Aditya Gulati, Luowen Qian, Henry Yuen.  
In proceedings of *Theory of Cryptography Conference (TCC) 2022*.  
Presented at *QCRYPT 2022*.  
Presented at *Quantum Information Processing (QIP) 2023* as **Short plenary**.  
Available at <https://arxiv.org/abs/2211.01444>
- C10. Cryptography from Pseudorandom Quantum States.  
Prabhanjan Ananth, Luowen Qian, Henry Yuen.  
In proceedings of *CRYPTO 2022*.  
Presented at *QCRYPT 2022*.  
Available at <https://arxiv.org/abs/2112.10020>
- C11. Quantum search-to-decision reductions and the state synthesis problem.  
Sandy Irani, Anand Natarajan, Chinmay Nirkhe, Sujit Rao, Henry Yuen.

In proceedings of *Computational Complexity Conference (CCC) 2022*.  
Presented at *Quantum Information Processing (QIP) 2022*.  
Available at <https://arxiv.org/abs/2111.02999>

- C12. Interactive proofs for synthesizing quantum states and unitaries.  
**Gregory Rosenthal**, Henry Yuen.  
In proceedings of *Innovations of Theoretical Computer Science (ITCS) 2022*.  
Presented at *Quantum Information Processing (QIP) 2022*.  
Available at <https://arxiv.org/abs/2108.07192>
- C13. Quantum Garbled Circuits.  
Zvika Brakerski, Henry Yuen.  
In proceedings of *Symposium on Theory of Computation (STOC) 2022*.  
Presented at *Quantum Information Processing (QIP) 2021*.  
Available at <https://arxiv.org/abs/2006.01085>
- C14. Nonlocal Games, Compression Theorems, and the Arithmetical Hierarchy.  
**Hamoon Mousavi**, **Seyed Sajjad Nezhadi**, Henry Yuen.  
In proceedings of *Symposium on Theory of Computation (STOC) 2022*.  
Presented at *Quantum Information Processing (QIP) 2022* as a **Plenary talk**.  
Available at <https://arxiv.org/abs/2110.04651>

2021

- C15. Quantum soundness of testing tensor codes.  
Zhengfeng Ji, Anand Natarajan, Thomas Vidick, John Wright, Henry Yuen.  
In proceedings of *Foundations of Computer Science (FOCS) 2021*.  
Available at <https://arxiv.org/abs/2111.08131>

2020

- C16. On the complexity of zero gap MIP\*.  
**Hamoon Mousavi**, **Seyed Sajjad Nezhadi**, Henry Yuen.  
Presented at *TQC 2020*.  
In proceedings of *Int'l Coll. on Automata, Languages, and Programming (ICALP) 2020*.

2019

- C17. Perfect zero knowledge for quantum multiprover interactive proofs.  
Alex B. Grilo, William Slofstra, Henry Yuen.  
Presented at *QCRYPT 2019*.  
Presented at *Quantum Information Processing (QIP) 2020*.  
In proceedings of *Foundations of Computer Science (FOCS) 2019*.

C18. Good approximate quantum LDPC codes from spacetime circuit Hamiltonians.

Thomas C. Bohdanowicz, Elizabeth Crosson, Chinmay Nirkhe, Henry Yuen.

Presented at *Quantum Information Processing (QIP) 2019*.

In proceedings of *Symposium on Theory of Computing (STOC) 2019*.

C19. Quantum proof systems for iterated exponential time, and beyond.

Joseph Fitzsimons, Zhengfeng Ji, Thomas Vidick, Henry Yuen.

Presented at *Quantum Information Processing (QIP) 2019*.

In proceedings of *Symposium on Theory of Computing (STOC) 2019*.

2018

C20. Approximate low-weight check codes and circuit lower bounds for noisy ground states.

Chinmay Nirkhe, Umesh Vazirani, Henry Yuen.

In proceedings of *Int'l Coll. on Automata, Languages, and Programming (ICALP) 2018*. pp. 91:1-11.

Presented at *TQC 2018*.

C21. Noise-tolerant testing of high entanglement of formation

Rotem Arnon-Friedman, Henry Yuen.

In proceedings of *Int'l Coll. on Automata, Languages, and Programming (ICALP) 2018*. pp. 11:1-12.

2017

C22. New security notions and feasibility results for authentication of quantum data

Sumegha Garg, Henry Yuen, and Mark Zhandry.

In proceedings of *Annual International Cryptology Conference (CRYPTO) 2017*, pp. 342–371. Presented at *QCrypt 2016*.

C23. Anchoring games for parallel repetition

Mohammad Bavarian, Thomas Vidick, and Henry Yuen.

In proceedings of *Symposium on Theory of Computing (STOC) 2017*, pp. 303–316.

**Presented as a Plenary Talk** at *Quantum Information Processing (QIP) 2016*.

C24. Multiplayer parallel repetition for expander games

Irit Dinur, Prahladh Harsha, Rakesh Venkat, and Henry Yuen.

In proceedings of *Innovations in Theoretical Computer Science (ITCS) 2017*, pp. 37:1–37:16. **Highlighted Talk** at ITCS 2017.

- C25. Parallel repetition via fortification: analytic view and the quantum case  
Mohammad Bavarian, Thomas Vidick, and Henry Yuen.  
In proceedings of *Innovations in Theoretical Computer Science (ITCS) 2017*,  
pp. 22:1–22:33.  
Presented at *TQC 2016*.

2016

- C26. A parallel repetition theorem for all entangled games  
Henry Yuen.  
In proceedings of *Int'l Coll. on Automata, Languages, and Programming (ICALP) 2016*, pp. 77:1–77:13.  
Presented at *Quantum Information Processing (QIP) 2017*.

- C27. A No-Go Theorem for Derandomized Parallel Repetition: Beyond Feige-Kilian  
Dana Moshkovitz, Govind Ramnarayan, and Henry Yuen  
In proceedings of *APPROX-RANDOM 2016*, pp. 43:3–42:29.

- C28. On the sum-of-squares degree of symmetric quadratic functions  
Troy Lee, Anupam Prakash, Ronald de Wolf, and Henry Yuen.  
In proceedings of *Computational Complexity Conference (CCC) 2016*, pp.  
17:1–17:31.

2015

- C29. Parallel repetition for entangled  $k$ -player games via fast quantum search  
Kai-min Chung, Xiaodi Wu and Henry Yuen.  
In proceedings of *Computational Complexity Conference (CCC) 2015*, pp.  
512–536

2014

- C30. Infinite Randomness Expansion and Amplification with a Constant Number  
of Devices  
Matthew Coudron and Henry Yuen.  
In proceedings of *Symposium on Theory of Computing (STOC) 2014*, pp. 427–  
436.  
Presented at *Quantum Information Processing (QIP) 2014*

2013

- C31. Robust Randomness Amplifiers: Upper and Lower Bounds  
Matthew Coudron, Thomas Vidick, and Henry Yuen.  
In proceedings of *APPROX-RANDOM 2013*, pp. 468–483.

2012

- C32. Continuous Time Channels with Interference  
Ioana Ivan, Michael Mitzenmacher, Justin Thaler, and Henry Yuen.  
In proceedings of *International Symposium on Information Theory (ISIT) 2012*, pp. 860-864

## Journal articles

2023

- J1. Rigidity of superdense coding.  
Ashwin Nayak, Henry Yuen.  
In *ACM Transactions on Quantum Computing*, Vol. 4, Iss. 4, pp 1–39 (2023).  
Available at <https://doi.org/10.1145/3593593>
- J2. An Improved Sample Complexity Lower Bound for Quantum State Tomography.  
Henry Yuen.  
In *Quantum* 7, 890 (2023).  
Available at <https://quantum-journal.org/papers/q-2023-01-03-890/>

2022

- J3. Quantum soundness of testing tensor codes.  
Zhengfeng Ji, Anand Natarajan, Thomas Vidick, John Wright, Henry Yuen.  
In *Discrete Analysis*, 2022:17.  
Available at <https://doi.org/10.19086/da.55554>
- J4. Anchored parallel repetition for nonlocal games.  
Mohammad Bavarian, Thomas Vidick, and Henry Yuen.  
In *SIAM Journal on Computing*, Vol. 51, No. 2, pp. 214–253 (2022).  
Available at <https://doi.org/10.1137/21M1405927>

2020

- J5. Exploring entanglement and optimization within the Hamiltonian Variational Ansatz.  
Roeland Wiersema, **Cunlu Zhou**, **Yvette de Sereville**, Juan Felipe Carrasquilla, Yong Baek Kim, Henry Yuen.  
In *Physical Review X Quantum* Vol. 1, Iss. 2 (2020).  
Available at <https://doi.org/10.1103/PRXQuantum.1.020319>

2016

- J6. Rescuing Complementarity With Little Drama.  
Ning Bao, Adam Bouland, Aidan Chatwin-Davies, Jason Pollack, and Henry



Yuen.

In *Journal of High Energy Physics (JHEP)*, 2016:26.

Available at [https://doi.org/10.1007/JHEP12\(2016\)026](https://doi.org/10.1007/JHEP12(2016)026)

2014

J7. A quantum lower bound for distinguishing random functions from random permutations.

Henry Yuen.

In *Quantum Information and Computation*, 14(9-10), 2014.

Available at <https://dl.acm.org/doi/10.5555/2685164.2685166>

## Preprints

2020

P1.  $MIP^* = RE$ .

Zhengfeng Ji, Anand Natarajan, Thomas Vidick, John Wright, Henry Yuen.

Under review.

Available at <https://arxiv.org/abs/2001.04383>

P2. Quantum soundness of the classical low-individual degree test.

Zhengfeng Ji, Anand Natarajan, Thomas Vidick, John Wright, Henry Yuen.

Available at <https://arxiv.org/abs/2009.12982>

P3. Quantum statistical query learning.

Srinivasan Arunachalam, Alex B. Grilo, Henry Yuen.

Available at <https://arxiv.org/abs/2002.08240>

2016

P4. Raz-McKenzie simulation with the inner product gadget.

Xiaodi Wu, Penghui Yao, Henry Yuen.

Electronic Colloquium on Computational Complexity 17-010.

Available at <https://ecc.weizmann.ac.il/report/2017/010/>

P5. A simple proof of Renner's exponential de Finetti theorem.

Thomas Vidick, Henry Yuen.

Available at <https://arxiv.org/abs/1608.04814>

## Talks

2024

*Towards a Complexity Theory for the Quantum Age*  
MIT CS Theory Colloquium.  
Harvard Quantum Seminar.

2023 *On the Pauli Spectrum of QAC0*  
IBM Quantum Technical Talk.

*The Compression Paradigm, and Parallel Repetition*  
Simons-Laufer Mathematical Sciences Institute Workshop on  $MIP^* = RE$ .

*A Complexity Theory for the Quantum Age?*  
UC Berkeley Theory Lunch.  
University of Maryland, QuICS Seminar.  
NYU CS Theory Seminar.  
Eastern Great Lakes Theory of Computation Workshop.  
University of Ottawa QUASAR Seminar.  
NYU Quantum Summit.

*Efficient, stable presentations from error-correcting codes*  
Fields Institute Workshop on Operator Algebras and Applications.

*Quantum Pseudorandom States*  
QCrypt 2023 Invited Tutorial.

*Unitary Complexity and the Uhlmann Transformation Problem*  
Princeton University CS Theory Lunch.

*When do we get quantum advantage?*  
Panel discussion at Columbia Physics Colloquium.

*A Tale of Turing Machines, Quantum Entanglement, and Operator Algebras.*  
Plenary talk at ITA 2023 Workshop.

*Minimal assumptions for quantum cryptography.*  
Simons Institute Meta-Complexity Seminar.

*Noncommutative Property Testing.*  
UC San Diego Functional Analysis Seminar.

2022 *A complexity theory for the Quantum Age?*  
Princeton Quantum Initiative Colloquium.  
Center for Quantum Information and Control Conference, University of Toronto.

*Cryptography from Pseudorandom Quantum States.*  
Illinois Quantum Information Seminar.

- 2021 *Noncommutative Property Testing.*  
 Simons Workshop on High-Dimensional Expanders.  
 Oberwolfach Complexity Workshop.  
 University of Delaware Quantum Information Seminar.
- Interactive Proofs for Synthesizing Quantum States and Unitaries.*  
 Quantum Wave Reunion Workshop, Simons Institute.
- Einstein meets Turing: the computability of nonlocal games.* (Keynote talk)  
 Computability in Europe Conference.
- Products of games.*  
 American Institute of Mathematics, Nonlocal Games Workshop.
- The role of proofs in  $MIP^* = RE$ .*  
 Quantum Information for Mathematics, Economics, and Statistics Workshop.  
 Simons Quantum Colloquium.
- Low-Degree Testing in the Noncommutative Setting.*  
 Global Noncommutative Geometry Seminar.
- Quantum Garbled Circuits.*  
 QuSoft seminar (CWI).  
 Ben-Gurion University Computer Science Seminar.  
 UC Berkeley Crypto Seminar.
- A Tale of Turing Machines, Quantum-Entangled Particles, and Operator Algebras.*  
 USC CS Theory Lunch.  
 Canada Quantum Days Keynote.
- 2020 *A Tale of Turing Machines, Quantum-Entangled Particles, and Operator Algebras.*  
 Richard M. Karp Distinguished Lecture.  
 University of Toronto Computer Science Distinguished Lecture Series.  
 Machine Learning in Science and Engineering (organized by Columbia Data Science Institute).
- Quantum entanglement through the computational lens*  
 University of Washington.  
 Columbia University.
- $MIP^* = RE$*   
 Canadian Operator Symposium.  
 Perimeter Institute Seminar.  
 University of Ottawa CRM Distinguished Speaker Colloquium.

UT Austin Groups & Dynamics seminar.  
TCS+ (online).  
Institute for Advanced Study (Princeton, New Jersey).  
Fields Institute Set Theory Seminar (Toronto, Canada).

*Multiprover protocols*

Quantum Wave Bootcamp workshop (Berkeley, California).

*Perfect zero knowledge for quantum multiprover interactive proofs*

Quantum Information Processing 2020 conference (Shenzhen, China).

2019

*Connes' Embedding Problem through the lens of complexity theory*

QLA meets QIT workshop at Purdue University (West Lafayette, Indiana).

University of Waterloo Pure Math Colloquium (Waterloo, Ontario).

*Perfect zero knowledge for quantum multiprover interactive proofs*

MIT Cryptography and Information Seminar (Cambridge, Massachusetts).

*Quantum proof systems for iterated exponential time, and beyond*

BIRS Workshop on the Many Faceted Connes Embedding Problem (Banff, Alberta).

Symposium on Theory of Computing (STOC) 2019 conference (Phoenix, Arizona).

Quantum Information Processing (QIP) 2019 conference (Boulder, Colorado).

*Circuit Hamiltonians, Hamiltonian complexity, and approximate error correction.*

Perimeter Institute Quantum Information Seminar (Waterloo, Ontario).

2018

*Quantum proof systems for iterated exponential time, and beyond*

Theoretical Computer Science seminar, University of Texas, Austin.

Institute for Quantum Computing Colloquium, University of Waterloo.

QuICS seminar, University of Maryland.

*Quantum Computing: Our Journey So Far*

Trinity College, University of Toronto.

*Noise-tolerant testing of high entanglement of formation*

International Colloquium on Automata, Languages, and Programming (ICALP)  
2018

(Prague, Czech Republic).

*Approximate low-weight check codes and circuit lower bounds for noisy ground states.*

International Colloquium on Automata, Languages, and Programming (ICALP)  
2018 conference (Prague, Czech Republic).

Workshop on Quantum Algorithms and Complexity Theory, Center for Quantum  
Technologies, Singapore.

- 2017 *Noise-tolerant testing of high-dimensional entanglement.*  
 Invited speaker to Asian Quantum Information Science (AQIS) 2017 conference (Singapore)  
 Centre for Quantum Information and Control (CQIQC) seminar (Toronto, Canada)
- Parallel repetition for entangled games.*  
 Innovations in Theoretical Computer Science (ITCS) 2017 conference (Berkeley, CA)  
 Symposium on Theory of Computing (STOC) 2017 conference (Montreal, Canada)
- 2016 *Quantum parallel repetition with polynomial decay.*  
 Joint Center for Quantum Information and Computer Science (College Park, Maryland)  
 ICALP conference (Rome, Italy)  
 Quantum Information Processing (QIP) 2017 conference (Seattle, WA)
- Anchoring games for parallel repetition.*  
 Caltech IQIM seminar (Pasadena, CA)  
 Quantum Information Processing (QIP) 2016 conference (Banff, Canada)  
 Hebrew University Quantum seminar (Jerusalem, Israel)  
 Weizmann Institute of Science (Rehovot, Israel)  
 NYU Theory Seminar (New York, NY)
- 2015 *Parallel repetition for entangled free games.*  
 MIT Algorithms and Complexity Seminar (Cambridge, MA)  
 Simons Institute Workshop on Information Theory in Complexity and Combinatorics (Berkeley, CA)  
 CWI Seminar (Amsterdam, Netherlands)  
 Computational Complexity Conference 2015 (Portland, OR)  
 Caltech IQIM Group Meeting (Pasadena, CA).
- Infinite randomness expansion.*  
 Princeton CS Theory Group Meeting (Princeton, NJ)  
 Foundations of Randomness Workshop (Stellenbosch Institute of Advanced Study, Stellenbosch, South Africa)
- 2014 *Infinite randomness expansion.*  
 Simons Institute Quantum Gathering seminar, Simons Institute Quantum Games Workshop (Berkeley, CA)  
 Symposium on the Theory of Computing (STOC) 2014 conference (New York, NY)  
 CWI Seminar (Amsterdam, Netherlands)  
 MIT Quantum Computing Group Meeting (Cambridge, MA).

## Advisees

- PhD (Columbia) Saachi Mutreja (Fall 2023 - )  
Natalie Parham (Fall 2022 - )  
John Bostanci (Fall 2022 - )  
Hamoon Mousavi (Spring 2019 - Summer 2023,  
Current position: Postdoc at UC Berkeley  
Thesis: *Some Aspects of Noncommutativity in Polynomial Optimization*)
- Undergrad (Columbia) Yulong Li (Summer 2021), Thomas Chen (Spring 2022), Zihan Hu (2022)
- Postdoc (U. of Toronto) Cunlu Zhou (Fall 2019 - Summer 2021).  
Current Position: Postdoctoral fellow at University of New Mexico).
- PhD (U. of Toronto) Adrian She (Spring 2019 - , University of Toronto,  
*co-advised with Toni Pitassi*  
Tentative Thesis: *Algebraic Methods in Quantum Information Theory*).
- Gregory Rosenthal (Spring 2020 - Summer 2023, University of Toronto,  
*co-advised with Ben Rossman*,  
Current position: Postdoc at University of Warwick/Cambridge University  
Thesis: *Quantum State and Unitary Complexity*).
- Arthur Mehta (Spring 2019 - Spring 2021, Ph.D. Math, University of Toronto.  
Current Position: Assistant Professor at University of Ottawa,  
Thesis: *Entanglement and non-locality in games and graphs*)
- Undergrad (Univ. of Toronto) Smik Patel (Summer 2020), Hugh Goatcher (Summer 2020), David Cui (2019),  
Sajjad Nezhadi (2019), Yvette De Sereville (Fall 2019)

## Other Thesis Committees

- Chuhan Lu (Ph.D. CS anticipated 2024, Portland State University)  
Marcel Dall'Agnol (Ph.D. CS 2023, University of Warwick)  
Ian Mertz (Ph.D. CS 2022, University of Toronto)  
Arthur Mehta (Ph.D. Math 2021, University of Toronto)  
Mihai Albiou (Ph.D. Math 2021, University of Toronto)

## Teaching

- Fall 2023 COMS 4281 Introduction to Quantum Computing  
Enrollment: 69  
Evaluations: Overall course quality (4.20/5), Instructor quality (4.52/5)  
Response Rate: (25/69)
- COMS 4236 Introduction to Computational Complexity  
Enrollment: 25  
Evaluations: Overall course quality (4.25/5), Instructor quality (5/5)  
Response Rate: (12/25)
- Fall 2022 COMS 4281 Introduction to Quantum Computing  
Enrollment: 53  
Evaluations: Overall course quality (4.48/5), Instructor quality (4.71/5)  
Response Rate: (22/53)
- Spring 2022 COMS 6998 Frontiers of Quantum Complexity and Cryptography  
Enrollment: 17  
Evaluations: Overall course quality (4.83/5), Instructor quality (5/5)  
Response Rate: (6/17)
- Spring 2021 COMS 4281 Introduction to Quantum Computing  
Enrollment: 64  
Evaluations: Overall course quality (4.32/5), Instructor quality (4.36/5)  
Response Rate: (24/64)

*Courses prior to Spring 2021 were taught at University of Toronto.*

- Fall 2020 CSC2429/MAT1752 Advanced Topics in Quantum Information Theory  
Enrollment: 20  
Evaluations: Overall course quality (4.7/5)
- Fall 2019 MAT344 Introduction to Combinatorics  
Enrollment: 155  
Evaluations: Overall course quality (4.1/5)
- CSC2451/MAT1751 Quantum Computing: Foundations to Frontier  
Enrollment: 44  
Evaluations: Overall course quality (4.6/5)
- Winter 2019 MAT344 Introduction to Combinatorics (Undergraduate)

Fall 2018 CSC2451/MAT1751 Quantum Computing: Foundations to Frontier (Graduate)

Spring 2015 Graduate Instructor in Advanced Complexity Theory, MIT.

## Service

### University/departmental service

- 2023 PhD Admissions Vice-Chair.
- 2021 - 2023 Computer Science Masters Program Advisor (Machine Learning/Foundations Track).  
Columbia Quantum Initiative Distinguished Lecture Series organizer.  
Columbia CS Theory Seminar organizer.
- 2021, 2022 PhD Fellowships committee.

*Service prior to Spring 2021 was performed at University of Toronto.*

- 2018 - 2020 Computer Science/Mathematics faculty search committee at University of Toronto.  
International liaison committee.  
Undergraduate research experience committee.  
Quantum Information faculty search committee.  
Working group on graduate admissions.  
Undergraduate Curriculum Committee.

### Workshop/conference organization

- 2023 Co-organizer of the Simons Laufer Mathematical Sciences Institute (SLMSI) Hot Topics workshop on  $MIP^* = RE$ .
- 2023 Workshop & Tutorial Co-chair for Foundations of Computer Science (FOCS) conference.
- 2021 Co-organizer of the *Summer Cluster in Quantum Computation* program at the Simons Institute in 2021.
- 2020 Chair organizer of the *Quantum Protocols: Testing & PCPs* workshop at the Simons Institute *The Quantum Wave in Computing* program in 2020.
- 2019 Main lecturer of the 5-day *Eighteenth Bellair's Crypto Workshop 2019* on “Applications of non-local games to quantum complexity and quantum cryptography”.



## **Program committees**

Quantum Information Processing (QIP) 2024  
International Colloquium on Automata, Languages, and Programs (ICALP) 2023  
Innovations in Theoretical Computer Science (ITCS) 2023  
Computational Complexity Conference (CCC) 2021  
Quantum Information Processing (QIP) 2021  
Quantum Information Processing (QIP) 2020  
Symposium on Theory of Computing (STOC) 2020  
Theory of Quantum Computing (TQC) 2018  
Computational Complexity Conference (CCC) 2018  
Innovations in Theoretical Computer Science (ITCS) 2017

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