Hamoon Mousavi

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RESEARCH AREAS	◇ **Quantum Information, Theoretical Computer Science**
EDUCATION	◇ **Columbia University**, 2019 – 2023 PhD, Computer Science *Advisor*: Henry Yuen
	◇ **University of Waterloo**, 2016 – 2019 MSc, Combinatorics and Optimization *Thesis:* Lower-bounds in Descriptive Complexity, *Advisor*: Debbie Leung
	◇ **University of Waterloo**, 2011 – 2013 MSc, Computer Science *Thesis:* Combinatorics on Words, *Advisor*: Jeffrey Shallit
	◇ **University of Tehran**, 2007 – 2011 BSc, Software Engineering
EMPLOYMENT	◇ Postdoctoral Fellow, **Simons Institute**, 2023 – 2025.
	◇ Software Engineer, **Google**, 2016 – 2018.
	◇ Software Engineer, **Intel**, 2014 – 2015.
SELECTED TALKS	◇ Nonlocal games, compression theorems, and the arithmetical hierarchy, **Plenary talk at QIP**, Pasadena, California, 2022.
	◇ Quantum correlations from groups, University of Ottawa, 2021.
	◇ On the complexity of zero-gap MIP*, **ICALP**, Saarbrücken, Germany, 2020.
	◇ A generalization of CHSH and the algebraic structure of optimal strategies, **QIP**, Shenzhen, China, 2020.
	◇ Beyond Tsirelson's theorem on XOR games, Math and CS Seminar, University of Waterloo, 2020.
	◇ On the applications of non-local games to quantum PCP, The 18th Bellairs Crypto-Workshop 2019, McGill's Bellairs Research Institute, Barbados, 2019.
PUBLICATIONS	◇ Nonlocal games, compression theorems, and the arithmetical hierarchy, HM, Seyed Sajjad Nezhadi, Henry Yuen. **QIP and STOC 2022**. arXiv:2110.04651v2.
	◇ Synchronous values of games, William Helton, HM, Seyed Sajjad Nezhadi, Vern Paulsen, Travis Russell, **Tsirelson Memorial Workshop 2022.** Submitted for journal publication. arXiv:2109.14741
	◇ On the complexity of zero-gap MIP*. HM, Seyed Sajjad Nezhadi, Henry Yuen. **ICALP 2020**. arXiv:2002.10490v2.
	◇ A generalization of CHSH and the algebraic structure of optimal strategies. David Cui, Arthur Mehta, HM, Seyed Sajjad Nezhadi. **Quantum Journal and QIP 2019**. arXiv:1911.01593v2.
	◇ Lower bounds on the length of regular expressions, preprint, arXiv:1712.00811
	◇ Decision algorithms for Fibonacci-automatic words, II: Related sequences and avoidability. Chen Fei Du, HM, Eric Rowland, Luke Schaeffer, and Jeffrey Shallit. *Theoretical Computer Science*, 657:146–162, 2017. arXiv:1406.0670.
	◇ Decision algorithms for Fibonacci-automatic words, III: Enumeration and abelian properties. Chen Fei Du, HM, Luke Schaeffer, and Jeffrey Shallit. *International Journal of Foundations of Computer Science*, 27:943–963, 2016.

◇ Decision algorithms for Fibonacci-automatic words, I: Basic results. HM, Luke Schaeffer, and Jeffrey Shallit. *RAIRO-Theoretical Informatics and Applications*, 50:39–66, 2016.

◇ A new approach to the paperfolding sequences. Daniel Goc, HM, Luke Schaeffer, and Jeffrey Shallit. *in Arnold Beckmann, Victor Mitrana, Mariya Soskova, eds., Evolving Computability: 11th Conference on Computability in Europe, CIE*, 9136:34–43, 2015.

◇ Mechanical proofs of properties of the tribonacci word. HM and Jeffrey Shallit. In Manea F., Nowotka D., eds., *Combinatorics on Words*, WORDS 2015, Lecture Notes in Computer Science, vol. 9304, Springer, Cham, 2015. arXiv:1407.5841.

◇ Automatic theorem proving in Walnut. HM, technical report, 2016. arXiv:1603.06017v1.

◇ Shortest repetition-free words accepted by automata. HM and Jeffrey Shallit. In Jurgensen H., Reis R., eds., *Descriptional Complexity of Formal Systems*, DCFS 2013, Lecture Notes in Computer Science, vol. 8031, Springer, Berlin, Heidelberg, 2013. arXiv:1304.2959.

◇ On the number of unbordered factors. Daniel Gŏc, HM, and Jeffrey Shallit. In Dediu AH., Martín-Vide C., Truthe B., eds., *Language and Automata Theory and Applications*, LATA 2013, Lecture Notes in Computer Science, vol. 7810, Springer, Berlin, Heidelberg, 2013. arXiv:1211.1301.

◇ Repetition avoidance in circular factors. HM and Jeffrey Shallit. In Béal MP., Carton O., eds, *Developments in Language Theory*, DLT 2013, Lecture Notes in Computer Science, vol. 7907, Springer, Berlin, Heidelberg, 2013. arXiv:1212.0052.

◇ Filtrations of formal languages by arithmetic progressions. HM and Jeffrey Shallit. *Fundamenta Informaticae*, 123(2):135–142, 2013. arXiv:1112.3758.

WORKSHOPS ◇ **The Quantum Wave in Computing: Reunion**, **Simons Institute**, Berkeley, California, 2022.

◇ **Nonlocal games in quantum information**, **American Institute of Mathematics**, San Jose, California, 2021.

◇ **The Quantum Wave in Computing**, **Simons Institute**, Berkeley, California, 2020.

◇ *The Nineteenth Bellairs's Crypto-Workshop*, McGill's Bellairs Research Institute, Barbados, 2020.

◇ *The Eighteenth Bellairs's Crypto-Workshop*, McGill's Bellairs Research Institute, Barbados, 2019.

AWARDS ◇ Alexander Graham Bell Canada Graduate Scholarship (**NSERC CGS D**), \$105,000 over 36 months, 2020 – 2023. Ranked 2nd out of 166 applicants in Scholarships and Fellowships Selection Committee for Computing Sciences.

◇ Ontario Graduate Scholarship (**OGS**), University of Toronto, 2019 – 2020.

SOFTWARE ◇ Designed and developed **Walnut**. Walnut is a free software for theorem proving in first-order logic. A Cambridge University Press book is published for Walnut in 2022. A list of more than 60 research papers using this software can be found here:
https://cs.uwaterloo.ca/~shallit/walnut.html.