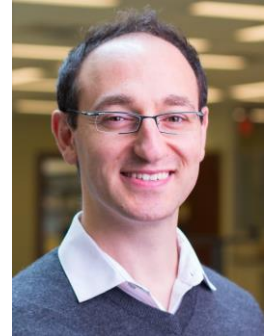


CURRICULUM VITAE

Sevag Gharibian

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RESEARCH INTERESTS

Theoretical computer science

- Algorithms: Approximation algorithms, exact algorithms, quantum algorithms
- Complexity theory: Proof systems, constraint satisfaction, quantum complexity theory

EMPLOYMENT

Assistant Professor Department of Computer Science, Virginia Commonwealth University, USA	2014 – present
Simons Postdoctoral Fellow Simons Institute for the Theory of Computing, University of California, Berkeley, USA Adviser: Dr. Umesh Vazirani	Jan – May 2014
NSERC Banting Postdoctoral Fellow Computer Science Division, University of California, Berkeley, USA Adviser: Dr. Umesh Vazirani	2013 – 2014
Visiting Lecturer Department of Computer Science, University of Illinois, Chicago, USA	Aug – Dec 2012
Research and Teaching Assistant Department of Computer Science, University of Waterloo, Canada	2006 – 2012
Software developer Embarcadero Technologies, Toronto, Canada	2005 – 2006
Software developer Positions with 5 companies as co-op student (see Industry Experience)	2001 – 2004

EDUCATION

Ph.D. in Computer Science, University of Waterloo, Canada Thesis: “Approximation, proof systems, and correlations in a quantum world” Supervisor: Dr. Richard Cleve	2008 – 2012
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Master of Mathematics, University of Waterloo, Canada	2008 – 2012
Thesis: “On the hardness of the quantum separability problem and the global power of locally invariant unitary operations”	
Supervisor: Dr. Richard Cleve	
Bachelor of Computer Science, Co-op, University of Waterloo, Canada	2000 – 2005

GRANTS

Total grant funding (as Assistant Professor beginning Fall 2014): 582,347 USD

Grants awarded:

- National Science Foundation (NSF) CCF-1617710 2016 – 2019
 Title: “AF: Small: Approximation algorithms for quantum mechanical problems.”
 Amount: 380,754 USD
- National Science Foundation (NSF) CCF-1526189 2015 – 2017
 Title: “AF: Small: Exact algorithms for the quantum satisfiability problem.”
 Amount: 196,593 USD
- Dean’s Undergraduate Research Initiative, VCU School of Engineering 2015
 Details: 5000 USD. Funding for undergrad research assistant, Aidan Collins.

FELLOWSHIPS AND SCHOLARSHIPS

Total fellowship/scholarship funding (Undergrad, Grad, Postdoc): 414,500 CAD (313,800 USD)

Fellowships/scholarships awarded:

- NSERC Banting Postdoctoral Fellowship 2013 – 2015
 Details: 140,000 CAD. NSERC’s top postdoctoral fellowship. Only 23 awarded annually, 6 of which can be taken up outside of Canada (as in my case).
- NSERC Postdoctoral Fellowship, 80,000 CAD, declined 2013 – 2015
- NSERC CGS Michael Smith Foreign Study Supplement, 6000 CAD 2010 – 2011
- European Union-Canada Exchange Scholarship, 10,000 CAD 2010 – 2011
- NSERC Alexander Graham Bell Canada Graduate Scholarship, 70,000 CAD 2010 – 2012
- President’s Graduate Scholarship, University of Waterloo, 20,000 CAD 2010 – 2012
- Ontario Graduate Scholarship, 30,000 CAD, declined 2010 – 2012
- David R. Cheriton Graduate Scholarship, 40,000 CAD 2009 – 2011
- Graduate Entrance Scholarship, University of Waterloo, 4000 CAD 2006

- Ontario Graduate Scholarship in Science and Technology, 10,000 CAD 2006 – 2007
- Tro Najarian Memorial Scholarship, Armenian Relief Society, 500 CAD 2005
- Cognos Scholarship, Cognos Inc., 4000 CAD 2001 – 2002

AWARDS

- Undergraduate Research Opportunities Faculty Mentor Award, VCU 2017
Details: Awarded for undergraduate research mentoring, based on student nominations
- Student Choice Award for Computer Science Faculty of the Year, VCU 2017
Details: Awarded by Engineering Student Council, based on votes from student body
- Teaching Excellence Award, Department of Computer Science, VCU 2016, 2017
- Achievement Award, Institute for Quantum Computing, University of Waterloo 2012
Details: 5000 CAD. Awarded for “exceptional achievement in research”.
- Best Poster Award, 14th Workshop on Quantum Information Processing (QIP) 2011
Details: Awarded for the “founding of a new research area”, as stated by award committee.
- 2nd Place for Best Speaker, 5th Canadian Quantum Information Students' Conference 2008

RESEARCH

Statistics (as per Google Scholar, February 9, 2017): Citations: 607, h-index: 10, i10-index: 11.

Preprints (in reverse chronological order)

- S. Gharibian and J. Yirka. The complexity of estimating local physical quantities. Available at <http://arxiv.org/abs/1606.05626>, 2016. To appear in the *Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC)*, 2017.
- A. Broadbent, S. Gharibian, and H.-S. Zhou. Quantum one-time memories from stateless hardware. <http://arxiv.org/abs/1511.01363>, 2015. Invited to TQI 2016 (see below).

Peer-Reviewed Journal Publications (in reverse chronological order)

- S. Gharibian, Y. Huang, Z. Landau, S. W. Shin. Quantum Hamiltonian Complexity. *Foundations and Trends in Theoretical Computer Science*, 10 (3):159-282, 2015.
- S. Gharibian, Z. Landau, S. W. Shin, and G. Wang. Tensor network non-zero testing. *Quantum Information & Computation* 15 (9 & 10):885-899, 2015.
- S. Gharibian and J. Kempe. Hardness of approximation for quantum problems. *Quantum Information & Computation* 14 (5 & 6): 517-540, 2014. (Conference version below.)

- D. Berry, R. Cleve and S. Gharibian. Gate-efficient discrete simulations of continuous-time quantum query algorithms. *Quantum Information & Computation* 14 (1 & 2): 1-30, 2014.
- S. Gharibian, J. Sikora, and S. Upadhyay. QMA variants with polynomially many provers. *Quantum Information & Computation* 13(1 & 2):0135-0157, 2013.
- S. Gharibian and J. Kempe. Approximation algorithms for QMA-complete problems. *SIAM Journal on Computing* 41(4): 1028-1050, 2012. (Conference version below.)
- S. Gharibian. Quantifying non-classicality with local unitary operations. *Physical Review A* 86:042106, 2012.
- M. Piani, S. Gharibian, G. Adesso, J. Calsamiglia, P. Horodecki and A. Winter. All non-classical correlations can be activated into distillable entanglement. *Physical Review Letters* 106: 220403, 2011.
- S. Gharibian, M. Piani, G. Adesso, J. Calsamiglia, P. Horodecki. Characterizing quantumness via entanglement creation. *International Journal of Quantum Information* 9(7 & 8):1701-1713, 2011.
- S. Gharibian. Strong NP-hardness of the quantum separability problem. *Quantum Information & Computation* 10(3 & 4): 343-360, 2010.
- S. Gharibian, H. Kampermann, and D. Bruß. On global effects caused by locally noneffective unitary operations. *Quantum Information & Computation* 9(11 & 12): 1013-1029, 2009.
- A. Datta and S. Gharibian. Signatures of non-classicality in mixed-state quantum computation. *Physical Review A* 79:042325, 2009.

Peer-Reviewed Conference Proceedings (in reverse chronological order)

- S. Gharibian and J. Yirka. The complexity of estimating local physical quantities. To appear in the *Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC)*, 2017.
- N. de Beaudrap and S. Gharibian. A linear time algorithm for quantum 2-SAT. *Proceedings of the 31st Conference on Computational Complexity (CCC)*, volume 50 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 27:1-27:21, 2016.
- S. Gharibian, J. Sikora. Ground state connectivity of local Hamiltonians. *Proceedings of the 42nd International Colloquium on Automata, Languages and Programming (ICALP)*, volume 9134 of *Lecture Notes in Computer Science*, pages 617 – 628, 2015.
- S. Gharibian and J. Kempe. Hardness of approximation for quantum problems. *Proceedings of the 39th International Colloquium on Automata, Languages and Programming (ICALP)*, pages 387-398, Springer, 2012. (Journal version above.)
- S. Gharibian and J. Kempe. Approximation algorithms for QMA-complete problems. *Proceedings of the 26th IEEE Conference on Computational Complexity (CCC)*, 178-188, 2011. (Journal version above.)

- D. Bruß, S. Gharibian, and H. Kampermann. Revealing quantum entanglement via locally noneffective operations. *Proceedings of 3rd International Symposium on Quantum Interaction (QI)*, pages 3-5, Springer, 2009. (Journal version above.)

Invited Talks (in reverse chronological order, grouped by paper)

- S. Gharibian, Y.-K. Liu. Classical approximation algorithms for quantum constraint satisfaction problems.
 - (Upcoming) SIAM Conference on Optimization, Vancouver, Canada, 2017.
 - Canadian Mathematical Society (CMS) Winter Meeting, Canada, 2016.
 - Semidefinite and Matrix Methods for Optimization and Communication, National University of Singapore, Singapore, 2016.
- (Declined due to scheduling conflicts) A. Broadbent, S. Gharibian, and H.-S. Zhou. Quantum one-time memories from stateless hardware. Trustworthy Quantum Information Workshop (TQI), Shanghai, China, 2016.
- S. Gharibian, J. Sikora. Ground state connectivity of local Hamiltonians.
 - Workshop around BQP, Tokyo Institute of Technology (Tamachi Campus), Japan, 2015. Presented by J. Sikora.
 - Quantum Hamiltonian Complexity Reunion Workshop, Simons Institute for the Theory of Computing, University of California, Berkeley, 2015.
- S. Gharibian, J. Kempe. Hardness of approximation for quantum problems. ELC Workshop on Inapproximability, University of Electro-Communications, Chofu, Japan, 2014.
- S. Gharibian. Quantifying non-classicality with local unitary operations. Mini-Workshop on the General Quantumness of Correlations, University of Waterloo, Canada, 2012.
- S. Gharibian and J. Kempe. Approximation algorithms for QMA-complete problems. Canadian Institute for Advanced Research (CIFAR) Quantum Information Processing meeting, Hot Topics Session, 2011.
- D. Bruß, S. Gharibian, and H. Kampermann. Revealing quantum entanglement via locally noneffective operations. 3rd International Symposium on Quantum Interaction (QI), 2009. Presented by D. Bruß.

Contributed Talks (in reverse chronological order, grouped by paper)

- S. Gharibian and J. Yirka. The complexity of estimating local physical quantities. To be presented at the *Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC)*, 2017.
- N. de Beaudrap and S. Gharibian. A linear time algorithm for quantum 2-SAT.
 - Computational Complexity Conference (CCC), 2016. Presented by N. de Beaudrap.
 - 19th Conference on Quantum Information Processing (QIP), 2016.

- S. Gharibian and J. Sikora. Ground state connectivity of local Hamiltonians. 42nd International Colloquium on Automata, Languages, and Programming (ICALP). Presented by J. Sikora.
- S. Gharibian, Z. Landau, S. W. Shin, and G. Wang. Tensor network non-zero testing. 14th Asian Quantum Information Science Conference (AQIS), 2014. Long talk. Presented by S. W. Shin.
- S. Gharibian and J. Kempe. Hardness of approximation for quantum problems.
 - 39th International Colloquium on Automata, Languages and Programming (ICALP), 2012.
 - 15th Workshop on Quantum Information Processing (QIP), 2012.
- D. Berry, R. Cleve and S. Gharibian. Gate-efficient discrete simulations of continuous-time quantum query algorithms.
 - 12th Asian Quantum Information Science Conference (AQIS), 2012. Presented by D. Berry.
- 15th Workshop on Quantum Information Processing (QIP), 2012. Presented by R. Cleve. S. Gharibian and J. Kempe. Approximation algorithms for QMA-complete problems. 26th IEEE Conference on Computational Complexity (CCC), 2011.
- S. Gharibian. Strong NP-hardness of the quantum separability problem.
 - 11th Annual Southwest Quantum Information and Technology Workshop (SQuInT), 2009.
 - 5th Canadian Quantum Information Students' Conference (CQISC), 2008.

Research Poster Presentations

- S. Gharibian and J. Yirka. The complexity of estimating local physical quantities. 20th Conference on Quantum Information Processing (QIP), 2017. To be presented by J. Yirka.
- A. Broadbent, S. Gharibian, and H.-S. Zhou. Quantum one-time memories from stateless hardware. 19th Conference on Quantum Information Processing (QIP), 2016.
- S. Gharibian and J. Sikora, Ground state connectivity of local Hamiltonians. 18th Workshop on Quantum Information Processing (QIP), 2015. Presented by J. Sikora.
- D. Berry, R. Cleve, S. Gharibian. Gate-efficient discrete simulations of continuous-time query algorithms. 16th Workshop on Quantum Information Processing (QIP), 2013. Presented by D. Berry.
- S. Gharibian, J. Sikora, and S. Upadhyay. QMA variants with polynomially many provers. 15th Workshop on Quantum Information Processing (QIP), 2012.
- S. Gharibian and J. Kempe. Approximation algorithms for QMA-complete problems. 14th Workshop on Quantum Information Processing (QIP 2011), and Quantum Information in Many-Body Physics, 2011.
- M. Piani, S. Gharibian, G. Adesso, J. Calsamiglia, P. Horodecki and A. Winter. All non-classical correlations can be activated into distillable entanglement. 14th Workshop on Quantum Information Processing (QIP), 2011. Presented by M. Piani.

- S. Gharibian. The computational complexity of detecting quantum entanglement. Cheriton Research Symposium, University of Waterloo, 2010.

Research Internships

- | | |
|---|----------------|
| Université Paris Diderot, France | Jan – Apr 2011 |
| ◦ Supervisor: Dr. Julia Kempe, Computer Science | |
| ◦ Topic: Hardness of approximation for quantum constraint satisfaction problems | |
| Université Paris-Sud 11, France | Jul – Sep 2010 |
| ◦ Supervisor: Dr. Julia Kempe, Computer Science | |
| ◦ Topic: Approximation algorithms for quantum constraint satisfaction problems | |
| Heinrich-Heine-Universität Düsseldorf, Germany | Jul – Aug 2007 |
| ◦ Supervisor: Dr. Dagmar Bruß, Theoretical Physics | |
| ◦ Topic: Theoretical detection and quantification of quantum entanglement | |
| Friedrich-Schiller-Universität Jena, Germany | May – Jun 2007 |
| ◦ Supervisor: Dr. Harald Hempel, Computer Science | |
| ◦ Topic: Fourier transform-based classical integer multiplication algorithms | |

STUDENT SUPERVISION

Ph.D. Students:

- | | |
|--|-------------|
| Jianqiang Li, Ph.D. candidate, Virginia Commonwealth University (VCU) | 2017 – 2021 |
| ◦ Topic: Approximation algorithms for quantum mechanical problems | |
| ◦ Funded by: NSF grant CCF-1617710 | |
| Seyran Saeedi, Ph.D. candidate, Virginia Commonwealth University (VCU) | 2015 – 2019 |
| ◦ Topic: Exact algorithms for quantum satisfiability problems | |
| ◦ Funded by: NSF grant CCF-1526189 | |

Masters Students:

- | | |
|---|-------------|
| Thomas Seo, Masters candidate, Virginia Commonwealth University (VCU) | 2016 – 2018 |
| ◦ Topic: Primal-dual algorithms for optimization | |

Undergraduate Research Assistants:

- | | |
|--|----------------|
| Paul Hudgins, VCU | 2017 – present |
| Justin Yirka, VCU | 2015 – 2016 |
| ◦ Topic: Quantum computational complexity of physical problems | |

- Aidan Collins, VCU 2014 – 2015
- Topic: Computational complexity in entanglement theory
 - Funded by: VCU SoEgr Dean's Undergraduate Research Initiative grant,
U.S. Department of Education Federal Work Study Program

Thesis Advisory Committee Member:

Robert Jaeger, Masters in Mathematics, Virginia Commonwealth University 2015

Capstone Project Supervisor:

Pooja Krishnan, Matthew Neal, Timothy Neal (undergraduates at VCU) 2016 – 2017

- Topic: Building an automated conference registration system

TEACHING**Teaching Experience***Course Instructor:*

- CMSC 691 Convex Optimization, VCU Fall 2016
Details: Graduate course. Class size: 21. Course evaluation rating: 4.44 / 5.
- CMSC 303 Introduction to the Theory of Computation, VCU 2015, 2016
Details: 2nd year course. Average class size: 89. Average course evaluation rating: 4.45 / 5.
- CMSC 491 Introduction to Quantum Computation and Information, VCU 2015
Details: 4th year course. Class size: 12. Course evaluation rating: 4.71 / 5.
- CS 401 Computer Algorithms I, University of Illinois, Chicago 2012
Details: 4th year course. Class size: 45. Course evaluation rating: 4.8 / 5.
- CS 301 Languages and Automata, University of Illinois, Chicago 2012
Details: 3rd year course. Class size: 42. Course evaluation rating: 4.82 / 5.

Head Teaching Assistant:

- Algorithms, University of Waterloo, 3rd year course 2010

Teaching Assistant:

- Algorithm Design and Analysis, University of Waterloo, 4th year course 2009

Instructional Assistant:

- Principles of Computer Science, University of Waterloo 2008 – 2009
Details: 1st year algorithms course. Class size: 30-60. Delivered two tutorials per week.

Lab Teaching Assistant:

- Developing Programming Principles, University of Waterloo 2010
Details: 1st year Java course. 80 students per lab.

Teaching Certifications

- Certificate in University Teaching, University of Waterloo 2012
- Three course program involving workshops, lecturing, and higher education research.
 - Authored a response paper for workshop “Understanding the Learner”, which was judged in a written review by the program coordinator as “exceptionally well written”, and made publicly available as a model response for future students in the program.

SERVICE

International and National Service*Conference Committees and Related Service*

- | | |
|---|-------------|
| Board of Trustees, Secretary
Computational Complexity Conference (CCC, and its organizing body, CCF) | 2016 – 2018 |
| Program Committee | |
| International Symposium on Algorithms and Computation (ISAAC) | 2017 |
| Asian Quantum Information Science Conference (AQIS) | 2017 |
| Conference on Theory of Quantum Computation, Communication and Cryptography (TQC) | 2015, 2016 |
| Student Travel Awards Committee | 2016 – 2017 |
| Annual Conference on Quantum Information Processing (QIP) | |
| Co-Chair | 2014 |
| VCU Mini-Workshop on Cryptography | |
| Proceedings Subcommittee | 2014 |
| IEEE Conference on Computational Complexity (CCC) | |
| Record Keeping and Registration Subcommittee | 2014 |
| IEEE Conference on Computational Complexity (CCC) | |
| Organizational Volunteer | 2013 |
| 54 th Annual Symposium on Foundations of Computer Science (FOCS) | |
| Organizing Committee | 2012 |
| 9 th Canadian Quantum Information Students' Conference (CQISC) | |

Journal Editorial Boards

- Founding Editor 2016
Quantum, open access journal for quantum physics, computation, and related areas.
 Selected from among 136 applicants (acceptance ratio: 25%) to act as one of the
 Founding Editors, URL: quantum-journal.org/

Scholarly Reviewer*Funding Agencies*

- National Science Foundation (NSF) Panel Service 2017

Conferences

- ACM Symposium on Theory of Computing (STOC)
 Conference on Computational Complexity (CCC)
 Innovations in Theoretical Computer Science (ITCS)
 International Colloquium on Automata, Languages, and Programming (ICALP)
 International Symposium on Mathematical Foundations of Computer Science (MFCS)
 Workshop in Quantum Information Processing (QIP)
 Conference on Theory of Quantum Computation, Communication and Cryptography (TQC)

Journals

- Communications in Mathematical Physics
 Entropy
 Nature Physics
 Physical Review A
 Physical Review Letters
 Quantum Information & Computing
 Quantum Information Processing
 SIAM Journal on Computing
 Scientific Reports, Nature Publishing Group

University Service*Chair*

- Master Teacher Task Force, VCU School of Engineering 2017
 Details: Appointed chair, tasked with improving quality of undergrad education
- Invited workshop on NSF Funding, VCU 2016
 Details: Organized, delivered workshop on strategies for obtaining NSF funding.
- Computer Science Day, VCU 2014 – present
 Details: Outreach event for high school students, 69 attendees from Virginia in 2016.
- Weekly Research Seminar, Department of Computer Science, VCU 2014 – 2017

Committee member

- Hiring Committee, Department of Computer Science, VCU 2016 – 2017
- High School Programming Contest, VCU 2014 – 2015

Coordinator

- Quantum Computing Reading Group, University of California, Berkeley 2013
- Weekly Lunch Seminar, Institute for Quantum Computing, Univ. of Waterloo 2008 – 2012

Outreach Event Volunteer

- Invited Panel Member, graduate orientation workshop on research/teaching, VCU 2016
- Grad Visit Day for prospective grad students, University of Waterloo 2012
- CS4U Day for high school students, University of Waterloo 2011
- School of Computer Science Open House for high school students, UW 2007, 2008, 2011
- Science Open House for Kids, ages 5-14, University of Waterloo 2009

Public Lectures

What are the theoretical limits of computing? Presented at:

- VCU Computer Science Day, outreach event for high school students 2015

An introduction to quantum computing. Presented at:

- VCU Computer Science Day, outreach event for high school students 2014 – 2016
- Francis Libermann Catholic High School, Toronto, Canada 2012
- Young Minds Lecture Series, Armen Karo Student Association, Toronto, Canada 2012

INDUSTRY EXPERIENCE

- *Software developer*, Embarcadero Technologies, Canada 2005 – 2006
 - Developed database management software using C++, Java, SQL
- *3D software developer (co-op)*, Side Effects Software, Canada Jan – Aug 2004
 - Developed 3D animation software using C++
- *Senior PC server developer (co-op)*, Canadian Imperial Bank of Commerce May – Aug 2003
- *Software developer (co-op)*, Cedara Software Corp., Canada Sep – Dec 2002
 - Developed medical imaging software using C++
- *Software developer (co-op)*, Third Eye Solutions Inc., Canada Jan – Apr 2002
 - Developed insurance premium financing software using Java
- *Software developer (co-op)*, Sun Microsystems Inc., Canada May – Aug 2001
 - Developed e-learning software using Java, Javascript