

# CURRICULUM VITAE JUSTIN THALER

## PERSONAL INFORMATION

Full Name: Justin Ross Thaler  
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## RESEARCH INTERESTS

Verifiable Computing, Quantum Computing, Algorithms for Massive Data, Computational Learning Theory

## EDUCATION

- Ph.D.** November 2013 - School of Engineering and Applied Sciences,  
Harvard University, Cambridge MA  
Adviser: Michael Mitzenmacher
- B.S.** 2005-2009 - Yale University, New Haven, CT  
Summa Cum Laude

## POSITIONS

- **Assistant Professor.** Department of Computer Science, Georgetown University, Washington D.C. August 2016-present.
- **Research Scientist.** Scalable Machine Learning Group. Yahoo Labs, New York, NY. June 2014-July 2016.
- **Research Fellow.** Simons Institute for the Theory of Computing, Berkeley, CA. August 2013-May 2014.
- **Ph.D. Student.** Harvard University, Cambridge, MA. September 2009-July 2013.
- **Adjunct at Center for Computing Sciences, Institute for Defense Analyses, Bowie, MD (2009-2014), Research Intern during Summer 2009.**

## ACADEMIC HONORS

- NSF CAREER Award. Project Title: The Polynomial Method in Complexity and Cryptography (2019).
- Best Newcomer Paper Award, *International Conference on Database Theory (ICDT)* (2016).
- Best Paper Award, *Symposium on Parallel Algorithms and Architectures (SPAA)* (2014).
- Best Paper Award, *International Colloquium on Automata, Languages, and Programming (ICALP)*, Track A (2013).
- NSF Graduate Research Fellowship Recipient (2010).
- National Defense Science and Engineering Graduate Fellow (2009-2012).
- Phi Beta Kappa (2009).
- Yale University Computer Science Prize (2009). Awarded by Yale University's Department of Computer Science to the graduating senior who ranks highest in scholarship.
- Anthony D. Stanley Memorial Prize (2009). Awarded by Yale University's Department of Mathematics for excellence in pure and applied mathematics.

## PUBLICATIONS

### Journal Papers

- (J1) **The Large-Error Approximate Degree of  $AC^0$ .** Mark Bun and Justin Thaler. Accepted to *Theory of Computing*, 2021. (Special Issue for RANDOM 2019, Extended Version of C7)
- (J2) **The Polynomial Method Strikes Back: Tight Quantum Query Bounds via Dual Polynomials.** Mark Bun, Robin Kothari, and Justin Thaler. *Theory of Computing*, 2020. (Invited paper. Extended version of C12).

- (J3) **Approximate Degree in Quantum and Classical Computing.** Mark Bun and Justin Thaler. Invited survey article for ACM SIGACT News Complexity Theory Column, December 2020 issue.
- (J4) **A Nearly Optimal Lower Bound on the Approximate Degree of  $AC^0$ .** Mark Bun and Justin Thaler. *SIAM Journal on Computing*, 2019. (Special Issue for FOCS 2017, Extended Version of C13).
- (J5) **On the Power of Statistical Zero Knowledge.** Adam Bouland, Lijie Chen, Dhiraj Holden, Justin Thaler, Prashant Nalini Vasudevan. *SIAM Journal on Computing*, 2019. (Special Issue for FOCS 2017, Extended Version of C14).
- (J6) **Verifiable Stream Computation and Arthur-Merlin Communication.** Amit Chakrabarti, Graham Cormode, Andrew McGregor, Justin Thaler, and Suresh Venkatasubramanian. *SIAM Journal on Computing*, 2019. (Extended Version of C27).
- (J7) **Dual Polynomials for Collision and Element Distinctness.** Mark Bun and Justin Thaler. *Theory of Computing*, 2016.
- (J8) **Parallel Peeling Algorithms.** Jiayang Jiang, Michael Mitzenmacher, and Justin Thaler. *ACM Transactions on Parallel Computing*. (Special issue devoted to SPAA 2014, Extended version of C28).
- (J9) **Dual Lower Bounds for Approximate Degree and Markov-Bernstein Inequalities.** Mark Bun and Justin Thaler. *Information and Computation*, 2015. (Special issue devoted to ICALP 2014, Extended Version of C33).
- (J10) **Annotations in Data Streams.** Amit Chakrabarti, Graham Cormode, Andrew McGregor, and Justin Thaler. *ACM Transactions on Algorithms*, 2014.
- (J11) **Streaming Graph Computations with a Helpful Advisor.** Graham Cormode, Michael Mitzenmacher, and Justin Thaler. *Algorithmica*, 2013. (Extended Version of C43).
- (J12) **External-Memory Multimaps.** Elaine Angelino, Michael T. Goodrich, Michael Mitzenmacher, and Justin Thaler. *Algorithmica*, 2013. (Special issue devoted to ISAAC 2011, Extended Version of C42).

## Conference Papers

- (C1) **Relative Error Streaming Quantiles.** Graham Cormode, Zohar Karnin, Edo Liberty, Justin Thaler, Pavel Veselý, To appear in *Principles of Database Systems (PODS)*, 2021.
- (C2) **Streaming Verification for Graph Problems: Optimal Tradeoffs and Nonlinear Sketches.** Amit Chakrabarti, Prantar Ghosh, Justin Thaler, Accepted to *International Conference on Randomization and Computation (RANDOM)*, 2020.
- (C3) **Improved Approximate Degree Bounds For  $k$ -Distinctness.** Nikhil Mande, Justin Thaler, and Shuchen Zhu. In *Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC)*, 2020.
- (C4) **Quantum Lower Bounds for Approximate Counting via Laurent Polynomials.** Scott Aaronson, Robin Kothari, William Kretschmer, and Justin Thaler. Accepted to *Computational Complexity Conference (CCC)*, 2020. Preliminary version in *Conference on Quantum Information Processing (QIP)*, 2020.
- (C5) **Approximate Degree, Secret Sharing, and Concentration Phenomena.** Andrej Bogdanov, Nikhil Mande, Justin Thaler, and Christopher Williamson. In *International Conference on Randomization and Computation (RANDOM)*, 2019.
- (C6) **Ad Hoc Multi-Input Functional Encryption.** Shweta Agrawal, Michael Clear, Ophir Frieder, Sanjam Garg, Adam O'Neill, and Justin Thaler. In *Innovations in Theoretical Computer Science (ITCS)*, 2020.
- (C7) **The Large-Error Approximate Degree of  $AC^0$ .** Mark Bun and Justin Thaler. In *International Conference on Randomization and Computation (RANDOM)*, 2019. **Invited to Theory of Computing (Special Issue for RANDOM 2019).**
- (C8) **Sign-Rank Can Increase Under Intersection.** Mark Bun, Nikhil Mande, and Justin Thaler. In *International Colloquium on Automata, Languages and Programming (ICALP)*, 2019.

- (C9) **Quantum Algorithms and Approximating Polynomials for Composed Functions with Shared Inputs.** Mark Bun, Robin Kothari, and Justin Thaler. In *Symposium on Discrete Algorithms (SODA)*, 2019.
- (C10) **Approximate Degree and the Complexity of Depth Three Circuits.** Mark Bun and Justin Thaler. In *International Conference on Randomization and Computation (RANDOM)*, 2018.
- (C11) **Doubly-efficient zkSNARKs without trusted setup.** Riad S. Wahby, Ioanna Tzialla, abhi shelat, Justin Thaler and Michael Walfish. In *IEEE Symposium on Security and Privacy (S&P)*, 2018.
- (C12) **The Polynomial Method Strikes Back: Tight Quantum Query Bounds via Dual Polynomials.** Mark Bun, Robin Kothari, and Justin Thaler. In *ACM Symposium on the Theory of Computing (STOC)*, 2018. Also presented at the 2018 *Conference on Quantum Information Processing (QIP)* as a **plenary talk. Invited to Theory of Computing.**
- (C13) **A Nearly Optimal Lower Bound on the Approximate Degree of  $AC^0$ .** Mark Bun and Justin Thaler. In *IEEE Symposium on Foundations of Computer Science (FOCS)*, 2017. **Invited to SICOMP (Special Issue for FOCS 2017).**
- (C14) **On the Power of Statistical Zero Knowledge.** Adam Bouland, Lijie Chen, Dhiraj Holden, Justin Thaler, Prashant Nalini Vasudevan. In *IEEE Symposium on Foundations of Computer Science (FOCS)*, 2017. **Invited to SICOMP (Special Issue for FOCS 2017).**
- (C15) **Full Accounting for Verifiable Outsourcing.** Riad S. Wahby, Ye Ji, Andrew J. Blumberg, abhi shelat, Justin Thaler, Michael Walfish, and Thomas Wies. In *Conference on Computer and Communications Security (CCS)*, 2017.
- (C16) **A High-Performance Algorithm for Identifying Frequent Items in Data Streams.** Daniel Anderson, Pryce, Bevin, Kevin Lang, Edo Liberty, Lee Rhodes, and Justin Thaler. In *Internet Measurement Conference (IMC)*, 2017.
- (C17) **Reliably Learning the ReLU in Polynomial Time.** Surbhi Goel, Varun Kanade, Adam Klivans, and Justin Thaler. In *Conference on Learning Theory (COLT)*, 2017.
- (C18) **Determining Tournament Payout Structures for Daily Fantasy Sports.** Christopher Musco, Maxim Sviridenko, and Justin Thaler. In *Meeting on Algorithm, Engineering & Experiments (ALENEX)*, 2017. **Invited to ACM Journal of Experimental Algorithmics (Special Issue for ALENEX 2017).**
- (C19) **Improved Bounds on the Sign-Rank of  $AC^0$ .** Mark Bun and Justin Thaler. In *International Colloquium on Automata, Languages and Programming (ICALP)*, 2016.
- (C20) **Lower Bounds for the Approximate Degree of Block-Composed Functions.** Justin Thaler. In *International Colloquium on Automata, Languages and Programming (ICALP)*, 2016.
- (C21) **Semi-Streaming Algorithms for Annotated Graph Streams.** Justin Thaler. In *International Colloquium on Automata, Languages and Programming (ICALP)*, 2016.
- (C22) **Space Lower Bounds for Itemset Frequency Sketches.** Edo Liberty, Michael Mitzenmacher, Justin Thaler, and Jonathan Ullman. In *Principles of Database Systems (PODS)*, 2016.
- (C23) **A Framework for Estimating Stream Expression Cardinalities.** Anirban Dasgupta, Kevin Lang, Lee Rhodes, and Justin Thaler. In *International Conference on Database Theory (ICDT)*, 2016. **Best Newcomer Paper Award. Invited to ACM Transactions on Database Systems (Special Issue for ICDT 2016).**
- (C24) **Streaming Verification in Data Analysis.** Samira Daruki, Justin Thaler, and Suresh Venkatasubramanian. In *International Symposium on Algorithms and Computation (ISAAC)*, 2015.
- (C25) **Hardness Amplification and the Approximate Degree of Constant-Depth Circuits.** Mark Bun and Justin Thaler. In *International Colloquium on Automata, Languages and Programming (ICALP)*, 2015.
- (C26) **Variable Selection is Hard.** Dean Foster, Howard Karloff, and Justin Thaler. In *Conference on Learning Theory (COLT)*, 2015.
- (C27) **Verifiable Stream Computation and Arthur-Merlin Communication.** Amit Chakrabarti, Graham Cormode, Andrew McGregor, Justin Thaler, and Suresh Venkatasubramanian. In *Computational Complexity Conference (CCC)*, 2015.

- (C28) **Parallel Peeling Algorithms.** Jiayang Jiang, Michael Mitzenmacher, and Justin Thaler. In *Symposium on Parallelism in Algorithms and Architectures (SPAA)*, 2014. **Best Paper Award. Invited to ACM Transactions on Parallel Computing (special issue for SPAA 2014).**
- (C29) **Distribution-Independent Reliable Learning.** Varun Kanade and Justin Thaler. In *Conference on Learning Theory (COLT)*, 2014.
- (C30) **Faster Private Release of Marginals on Small Databases.** Karthekeyan Chandrasekaran, Justin Thaler, Jonathan Ullman, Andrew Wan. In *Innovations in Theoretical Computer Science (ITCS)*, 2014.
- (C31) **Annotations for Sparse Data Streams.** Amit Chakrabarti, Graham Cormode, Navin Goyal, and Justin Thaler. In *Symposium on Discrete Algorithms (SODA)*, 2014.
- (C32) **Time-Optimal Interactive Proofs for Circuit Evaluation.** Justin Thaler. In *International Cryptology Conference (CRYPTO)*, 2013.
- (C33) **Dual Lower Bounds for Approximate Degree and Markov-Bernstein Inequalities.** Mark Bun and Justin Thaler. In *International Colloquium on Automata, Languages and Programming (ICALP)*, 2013. **Best Paper Award for Track A. Invited to Information and Computation (special issue for ICALP 2013).**
- (C34) **Cache-Oblivious Dictionaries and Multimaps with Negligible Failure Probability.** Michael Goodrich, Dan Hirschberg, Michael Mitzenmacher, and Justin Thaler. In *Mediterranean Conference on Algorithms (MedAlg)*, 2012.
- (C35) **Verifying Computations with Streaming Interactive Proofs.** Graham Cormode, Justin Thaler, and Ke Yi. In *VLDB*, 2011.
- (C36) **Faster Algorithms for Privately Releasing Marginals.** Justin Thaler, Jonathan Ullman, and Salil Vadhan. In *International Colloquium on Automata, Languages and Programming (ICALP)*, 2012.
- (C37) **Attribute-Efficient Learning and Weight-Degree Tradeoffs for Polynomial Threshold Functions.** Rocco Servedio, Li-Yang Tan, and Justin Thaler. In *Conference on Learning Theory (COLT)*, 2012.
- (C38) **Verifiable Computation with Massively Parallel Interactive Proofs.** Justin Thaler, Mike Roberts, Michael Mitzenmacher, and Hanspeter Pfister. In *USENIX Workshop on Hot Topics in Cloud Computing (HotCloud)*, 2012.
- (C39) **Continuous Time Channels with Interference.** Ioana Ivan, Michael Mitzenmacher, Justin Thaler, and Henry Yuen. In *International Symposium on Information Theory (ISIT)*, 2012.
- (C40) **Hierarchical Heavy Hitters with the Space Saving Algorithm.** Michael Mitzenmacher, Thomas Steinke, and Justin Thaler. In *Meeting on Algorithm, Engineering & Experiments (ALENEX)*, 2012.
- (C41) **Practical Verified Computation with Streaming Interactive Proofs.** Graham Cormode, Michael Mitzenmacher, and Justin Thaler. In *Innovations in Theoretical Computer Science (ITCS)*, 2012.
- (C42) **External-Memory Multimaps.** Elaine Angelino, Michael T. Goodrich, Michael Mitzenmacher, and Justin Thaler. In *International Symposium on Algorithms and Computation (ISAAC)*, 2011.
- (C43) **Streaming Graph Computations with a Helpful Advisor.** Graham Cormode, Michael Mitzenmacher, and Justin Thaler. In *European Symposium on Algorithms (ESA)*, 2010.
- (C44) **Graph Covers and Quadratic Minimization.** Nicholas Ruoizzi, Justin Thaler, and Sekhar Tatikonda. In *Allerton Conference on Communication, Control, and Computing*, 2009.

## Invited Papers and Workshop Papers

- (I1) **Community Proposal: A Benchmarking Framework for (Zero-Knowledge) Proof Systems.** Daniel Benarroch, Aurélien Nicolas, Justin Thaler, and Eran Tromer. 3rd ZKProof Standardization Workshop, April 2020. Awarded best paper at the workshop.
- (I2) **Catching Lies (and Mistakes) in Offloaded Computation.** Michael Mitzenmacher and Justin Thaler. Communications of the ACM (CACM), February 2016. (Invited Technical Perspective).
- (I3) **Data Stream Verification.** Justin Thaler. *Encyclopedia of Algorithms*. Springer Berlin Heidelberg, 2015. (Invited Survey Article).

- (I4) **Peeling Arguments and Double Hashing.** Michael Mitzenmacher and Justin Thaler. Appears as an invited paper in *Allerton Conference on Communication, Control, and Computing*, 2012.
- (I5) **On the Zero-Error Capacity Threshold for Deletion Channels.** Ian Kash, Michael Mitzenmacher, Justin Thaler, and Jonathan Ullman. In *Information Theory and Applications Workshop (ITA)*, 2011.

## Manuscripts

- (M1) **Proofs, Arguments, and Zero-Knowledge.** Justin Thaler, 2020. Draft monograph available online at <http://people.cs.georgetown.edu/jthaler/ProofsArgsAndZK.html>.
- (M2) **Vanishing-Error Approximate Degree and QMA Complexity.** Alexander A. Sherstov and Justin Thaler, 2020.
- (M3) **Linear-time zero-knowledge SNARKs for R1CS.** Jonathan Lee, Srinath Setty, Justin Thaler, and Riad Wahby, 2021.
- (M4) **Quantum Proofs of Proximity.** Marcel Dall'Agnol Tom Gur, Subhayan Roy Moulik, and Justin Thaler, 2021.
- (M5) **A Note on the GKR Protocol.** Justin Thaler. 2015.
- (M6) **Verifiable Computation Using Multiple Provers.** Andrew J. Blumberg, Justin Thaler, Victor Vu, and Michael Walfish. 2014.

## SELECTED INVITED TALKS AND LECTURE SERIES

- **Quantum Lower Bounds via Laurent Polynomials.**
  - Dartmouth Theory of Computing Seminar, Fall 2020.
  - Harvard Theory of Computing Seminar, Fall 2019.
- **Interactive Proofs.**
  - Two-hour survey talk during Boot Camp for the Simons Institute Proofs, Consensus, and Decentralizing Society Program, Fall 2019.
  - Additional two-hour followup talk given internally at Simons Institute Proofs, Consensus, and Decentralizing Society Program, Fall 2019.
  - Delivered related tutorial at NIST Crypto reading group, Fall 2019.
- **Approximate Degree: A Survey.**
  - Invited talk at CMO 2018 workshop on Analytic Techniques in Theoretical Computer Science
- **The Polynomial Method Strikes Back.**
  - Invited talk at the Harvard/MIT/MSR Theory Reading Group (October 2017)
  - Invited talk at NYU Theory Seminar (December 2017)
  - Invited talk at University of Maryland's QuICS Seminar (January 2017)
- **Verifiable Computing: Between Theory and Practice.**
  - Invited survey talk at the *STOC* 2017 workshop on *Probabilistically Checkable and Interactive Proofs (PCP/IP): Between Theory and Practice* (June 2017).
- **A Nearly Optimal Lower Bound on the Approximate Degree of  $AC^0$ .**
  - Invited talk at BIRS 2017 workshop on Communication Complexity and its Applications II
  - Invited talk at Columbia University Theory Seminar (April 2017)
- **Chebyshev Polynomials, Approximate Degree, and their Applications.**
  - Invited survey talk at the *FOCS* 2016 workshop on *(Some) Orthogonal Polynomials and their Applications to TCS*.
- **Verifiable Computation.**
  - Invited speaker at the Fourteenth Bellairs' Crypto-Workshop (Invited Lecture Series). Delivered 15 hours of lectures surveying modern techniques for proof-based verifiable computation. Workshop organized by Claude Crépeau.
- **Interactive Proofs and Argument Systems.**
  - Invited speaker at the Summer School on Secure and Oblivious Computation and Outsourcing at the University of Notre Dame. Delivered 3 hours of lectures surveying modern techniques for proof-based verifiable computation. Summer school organized by Marina Blanton.

## GRANTS AND FUNDING

- **DARPA Award (Agreement No. HR00112020022).**
  - Project Title: ZK Proofs Unbound: Next-Generation Pipelines for Real-world Applications.
  - DARPA Program: Securing Information for Encrypted Verification and Evaluation (SIEVE).
  - Role: Georgetown PI (collaborative work with NYU, UPenn, Columbia, and Stanford).
  - Amount: \$5,715,365. Georgetown's share: \$500,000.
  - Dates: May 2020-March 2024.
- **National Science Foundation Award #1918989.**
  - Project Title: Automatically Parallelizing Approximate Data Analysis with Mergeable Summaries.
  - NSF Program: Scalable Parallelism in the Extreme.
  - Role: PI.
  - Amount: \$614,203.
  - Dates: October 2019-September 2023.
- **National Science Foundation CAREER Award #1845125.**
  - Project Title: The Polynomial Method in Complexity and Cryptography.
  - NSF Program: Algorithmic Foundations.
  - Role: PI.
  - Amount: \$549,045.
  - Dates: June 2019-May 2024.
- **Research Seed Grant (Internal) from Georgetown University's Massive Data Institute.**
  - Project Title: Enabling Analysis of Sensitive Data via Zero-Knowledge Proofs.
  - Role: PI.
  - Amount: \$40,000.
  - Dates: July 2017-June 2018

## U.S. PATENTS

- **Automatic Fantasy Sports Data Analysis Method and Apparatus.** Michael Lazarus, Maxim Sviridenko, and Justin Thaler. Patent number: US10463975B2. Type: Grant. Filed: June 30, 2016. Date of Patent: November 5, 2019. Assignee: OATH INC.
- **Fantasy Sports Data Analysis for Game Structure Development.** Justin Thaler, Maxim Sviridenko, Edo Liberty, Ron Belmarch, Jerry Shen, and Prerit Uppal. Patent number: US10207188B2. Date of Patent: Feb. 19, 2019. Assignee: OATH INC.

## OPEN SOURCE SOFTWARE DEVELOPMENT

- Co-creator and core contributor to an open source library of highly optimized streaming algorithms, called *DataSketches* (url: <https://datasketches.apache.org/>). The library is used within several companies, including Verizon, Netflix, Nielsen, and Splice Machine. It also has been incorporated into a popular open source graph database library called Gaffer that is maintained by the British intelligence agency GCHQ, and into a low-latency open source data store called Druid. In April 2019, the library was accepted by the Apache Software Foundation (ASF) as an Apache Incubation project and was promoted to a top-level ASF project in December 2020.

## TEACHING

- COSC 548 – Streaming Algorithms (Fall 2016, Fall 2018)
- ANLY 550 – Structures and Algorithms for Analytics (Spring of: 2017, 2018 (2 sections), 2019)
- COSC 544 – Probabilistic Proof Systems (Fall 2017, Fall 2020)
- ANLY 558 – Advanced Algorithms for Analytics (Spring 2021)

## PROFESSIONAL ACTIVITIES

- **PC Member:** TCC 2021, ESA 2021, TCC 2020, ZKProof Standardization Proposal Committee (2019, 2020), STOC 2019, SOSA 2019, SODA 2018, FSTTCS 2017, ICALP 2016, ALENEX 2016, SDM 2015.
- **Grant Reviews and Panels:** National Science Foundation Panel (2017, 2019, 2020), Computing Innovation Fellows 2020 Reviewer, External reviewer for Research Grants Council of Hong Kong (2018) and Israel Science Foundation (2019, 2020).
- **Workshop Organization:** Co-organizer of Capital Area Theory Day (2018). Co-organizer and chair of the 5-day workshop on Probabilistically Checkable and Interactive Proof Systems at Simons Institute for the Theory of Computing (October 2019).
- **Journal reviewer:** *SICOMP*, *Computational Complexity*, *Journal of Cryptology*, *Theory of Computing*, *SIAM Journal on Discrete Mathematics*, *Information and Computation*, *Algorithmica*, *Communications of the ACM*, *Discrete and Computational Geometry*, *Theoretical Computer Science*, *Frontiers in ICT (Big Data Section)*, *Information Processing Letters*.
- **External conference reviewer:** STOC, FOCS, CCC, SODA, CRYPTO, ICALP, ITCS, RANDOM, PODS, NIPS, ICDT, PODC, DISC, TCC, ESORICS, ESA, MFCS.

## ADVISING AND MENTORSHIP

- Ph.D. advisor for Shuchen Zhu, currently a third-year Ph.D. student in Georgetown University's Department of Computer Science (Spring 2018-present).
- Ph.D. advisor for Sidhant Saraogi, currently a first-year Ph.D. student in Georgetown University's Department of Computer Science (Fall 2020-present).
- Mentor of postdoctoral scholar Nikhil Mande (Spring 2019-present).
- Co-mentor of postdoctoral scholar Michael Clear, joint with Adam O'Neill (Fall 2017-Fall 2018).
- Hosted 5-week visit from Nikhil Mande, graduate student at Tata Institute of Fundamental Research.
- Mentored two Georgetown University undergraduates, Pryce Bevan and Daniel Anderson, on a year-long research project on streaming algorithms that led to publication (C16) above.
- Co-host for Yahoo Labs intern Christopher Musco, Ph.D. student at MIT (Summer 2015).

## THESIS COMMITTEE MEMBERSHIP

- External Ph.D. thesis examiner for Christopher Hickey, University of Warwick Department of Computer Science (viva exam occurred in December 2020).
- Ph.D. proposal and thesis committee member for Hao-Ren Yao, Georgetown University Department of Computer Science (thesis defense occurred in March 2021).
- Ph.D. proposal and thesis committee member for Sean Macavaney, Georgetown University Department of Computer Science. Thesis defense scheduled for March 2021.
- Ph.D. proposal and thesis committee member for Chris Flagg, Georgetown University Department of Computer Science. Thesis defense scheduled for April 2021.
- Ph.D. qualifying and thesis committee member for Jeffrey Cohn, Georgetown University Department of Physics (thesis defense in April 2019).
- Ph.D. proposal and thesis committee member. Samira Daruki, University of Utah (thesis defense in May 2017).

## SERVICE TO GEORGETOWN UNIVERSITY

- CS Graduate Committee (Fall 2019-Spring 2020, Spring 2021).
- Department of Computer Science Student Engagement Committee (Fall 2020-present).
- CS Colloquium Committee (Fall 2016-Spring 2019).
- Steering Committee Member for Georgetown's M.S. in Analytics (Fall 2017-Spring 2018).
- Computer Science Faculty Advisory Committee (Fall 2018-Spring 2019)
- Admissions Committee Member for Georgetown's M.S. in Analytics (Spring 2017).
- Participant in Campaign Planning: Big Ideas—Big Data. Fall 2017.

## SCIENTIFIC ADVISORY BOARD POSITIONS

- QEDIT Systems LTD (September 2019-present)