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Areas of Interest

Complexity Theory, Analysis of Boolean functions, Learning theory, Applied Probability

Education

- **University of California, Berkeley**
Ph.D. in Computer Science -2008-2013
Research advisor: Luca Trevisan
Chair of Dissertation Committee: Umesh V. Vazirani and Luca Trevisan
- **Indian Institute of Technology, Kanpur, India**
B.Tech in Computer Science and Engineering - 2004-2008

Employment

- **Assistant Professor:** CIS, University of Pennsylvania, 2019-present
- **Assistant Professor:** EECS, Northwestern University, 2015-2018.
- **Postdoctoral associate:** DIMACS, Rutgers (Mentor: Prof. Michael Saks), 2014-15.
- **Visitor:** School of Math, Institute for Advanced Study, 2014-15.
- **Member:** School of Math, Institute for Advanced Study (Mentor: Prof. Avi Wigderson), 2013-14.
- **Research fellow:** Simons Institute, UC Berkeley (Mentor: Prof. Luca Trevisan), Fall 2013.
- **Visiting researcher:** New York University (with Prof. Oded Regev), May-August 2013.
- **Visiting researcher:** Columbia University (with Prof. Rocco A. Servedio), May-August 2011, 2012.
- **Summer Intern:** Microsoft Research, Silicon Valley (with Dr. Cynthia Dwork), May-August 2010.

Awards

- IBM Pat Goldberg Memorial best paper award for 2014 for “Nearly optimal solutions for the Chow Parameters Problem and low-weight approximation of halfspaces”.
- Co-winner of the best student paper award at Theory of Cryptography Conference (TCC) 2012.
- Berkeley fellowship for Graduate Study 2008-2010
- President of India Gold Medal for the best academic performance among all departments in graduating class of 2008 at IIT Kanpur

Journal publications

- **Optimal mean-based algorithms for trace reconstruction**
(with Ryan O’Donnell and Rocco Servedio), *Annals of Applied Probability*, 2019.
- **A new central limit theorem and decomposition for Gaussian polynomials, with an application to deterministic approximate counting**
(with Rocco Servedio), *Probability Theory and Related Fields*, 2017.
- **Inverse Shapley Value Problem**
(with Ilias Diakonikolas and Rocco Servedio), *Games and Economic Behavior*, 2017.
- **A Robust Khintchine Inequality, and Algorithms for Computing Optimal Constants in Fourier Analysis and High-Dimensional Geometry**
(with Ilias Diakonikolas and Rocco Servedio), *SIAM Journal on Discrete Math*, 2016.
- **Majority is Stablest: Discrete and SoS**
(with Elchanan Mossel and Joe Neeman), *Theory of Computing*, 2016.
- **Nearly optimal solutions for the Chow parameters problem and low-weight approximations of halfspaces**
(with Ilias Diakonikolas, Vitaly Feldman and Rocco Servedio), *Journal of the ACM*, 2014.
- **Explicit optimal hardness via Gaussian stability results**
(with Elchanan Mossel), *ACM Transaction of Computation Theory*, 2013.
- **Fast Integer Multiplication using Modular Arithmetic**
(with Piyush P Kurur, Chandan Saha and Ramprasad Saptharishi), *SIAM Journal on Computing*, 2013.
- **Trevisan’s extractor in the presence of quantum side information**
(with Christopher Portmann, Thomas Vidick and Renato Renner), *SIAM Journal on Computing*, 2012.
- **Extractors and lower bounds for locally samplable distributions**
(with Thomas Watson), *ACM Transaction of Computation Theory*, 2012.

Conference publications

- **Density estimation for shift invariant multidimensional distributions**
(with Philip Long and Rocco Servedio), ITCS 2019
- **Learning sums of independent random variables with sparse collective support**
(with Philip Long and Rocco Servedio), FOCS 2018
- **Boolean function analysis meets stochastic optimization: An approximation scheme for stochastic knapsack**
SODA, 2018
- **Non-interactive simulation of correlated distributions is decidable**
(with Elchanan Mossel and Joe Neeman), *SODA*, 2018
- **Optimal mean-based algorithms for trace reconstruction**
(with Ryan O’Donnell and Rocco Servedio), *STOC*, 2017
- **Noise stability is computable and low-dimensional**
(with Elchanan Mossel and Joe Neeman), *CCC*, 2017
- **Noisy population recovery in polynomial time**
(with Michael Saks and Sijian Tang), *FOCS*, 2016
- **A size free CLT for poisson multinomials and its applications.**
(with Costis Daskalakis, Gautam Kamath and Christos Tzamos), *STOC*, 2016

- **Beyond the central limit theorem: asymptotic expansions and pseudorandomness for combinatorial sums**
FOCS, 2015
- **Boolean monotonicity testing requires (almost) $n^{1/2}$ non-adaptive queries**
(with Xi Chen, Rocco Servedio and Li-Yang Tan), *STOC, 2015*
- **Learning distributions from satisfying assignments**
(with Ilias Diakonikolas and Rocco Servedio), *SODA, 2015*
- **Efficient deterministic approximate counting for low-degree PTFs**
(with Rocco Servedio), *STOC, 2014*.
- **Deterministically counting satisfying assignments for juntas of degree-2 PTFs**
(with Ilias Diakonikolas and Rocco Servedio), *CCC, 2014*.
- **A Polynomial time approximation scheme for fault-tolerant distributed storage**
(with Costis Daskalakis, Ilias Diakonikolas, Ankur Moitra and Rocco Servedio), *SODA, 2014*.
- **Majority is Stablest : Discrete and SoS**
(with Elchanan Mossel and Joe Neeman), *STOC, 2013*.
- **A Robust Khintchine Inequality, and Algorithms for Computing Optimal Constants in Fourier Analysis and High-Dimensional Geometry**
(with Ilias Diakonikolas and Rocco Servedio), *ICALP, 2013*.
- **Nearly optimal solutions for the Chow parameters problem and low-weight approximations of halfspaces**
(with Ilias Diakonikolas, Vitaly Feldman and Rocco Servedio), *STOC, 2012*.
- **The Inverse Shapley Value Problem**
(with Ilias Diakonikolas and Rocco Servedio), *ICALP, 2012*.
- **Lower bounds in Differential Privacy**
TCC, 2012.
- **Pseudorandomness for permutation and regular branching programs**
CCC, 2011.
- **Extractors and lower bounds for locally samplable distributions**
(with Thomas Watson), *APPROX-RANDOM, 2011*.
- **Non-uniform attacks against one-way functions and PRGs**
(with Luca Trevisan and Madhur Tulsiani), *CRYPTO, 2010*.
- **Near optimal extractors against quantum storage**
(with Thomas Vidick), *QIP, 2010* , *STOC, 2010*.
- **Improved pseudorandom generators against DNFs**
(with Omid Etesami, Luca Trevisan and Madhur Tulsiani), *APPROX-RANDOM, 2010*.
- **Extractors using hardness amplification**
(with Luca Trevisan), *APPROX-RANDOM, 2009*.
- **Fast Integer Multiplication using Modular Arithmetic**
(with Piyush P Kurur, Chandan Saha and Ramprasad Satharishi), *STOC, 2008*.

Mentoring experience

PhD students

- **Aidao Chen:** (at Northwestern, expected PhD 2022) co-advised with Aravindan Vijayaraghavan

Postdocs

- **Huxley Bennett:** (at Northwestern, 2017-2019) co-mentored with Aravindan Vijayaraghavan.
- **Xue Chen:** (at Northwestern, 2018-2020) co-mentored with Konstantin Makarychev and Aravindan Vijayaraghavan.

Funding

- **NSF AF Small 2018-2021:** “Boolean function analysis meets stochastic design” (PI: Anindya De, co-PI: Rocco Servedio).

Teaching Experience

- **Theory of Computation:** (Rutgers – Fall 2014), (Northwestern – Winter 2016, Fall 2016, Winter 2017, Fall 2018), (Penn – Spring 2019).
- **Introduction to Computational Learning Theory:** (Northwestern – Spring 2016, Spring 2017)
- **Graduate Complexity Theory:** (Northwestern – Fall 2017)
- **Analytical methods in computer Science:** (Northwestern – Fall 2016)
- **Randomized algorithms:** (Northwestern – Spring 2018)

Professional Experience

- **Conference Program Committee :** RANDOM 2015, CCC 2016, FOCS 2017.
- **Conference Refereeing :** STOC, FOCS, CCC, RANDOM, TCC, PODS, SOFSEM, STACS, SODA, ICALP, ESA, FSTTCS
- **Journal Refereeing :** SIAM J. on Computing, SIAM J. on Discrete Math., Theory of Computing, Algorithmica, Journal of the ACM