ARNAB BHATTACHARYYA

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AREAS OF INTEREST

Theoretical Computer Science; more specifically: algorithms for big data, probability, statistics, property testing, complexity theory, coding theory, computational viewpoint for natural systems.

EDUCATION & TRAINING

Massachusetts Institute of Technology	
Ph.D. in Computer Science (Advisor: Ronitt Rubinfeld)	2012, June
M.Eng. in Computer Science (Advisor: G.J. Sussman)	2006
S.B. in Computer Science and Physics, minor in Mathematics	2005
CCI Postdoctoral fellow at Princeton University (Mentor: B. Chazelle)	2011-12
DIMACS Postdoctoral associate at Rutgers University (Mentor: S. Muthukrishnan)	2012-13

RELATED EXPERIENCE

Long-term visitor at the Simons Institute for the Theory of Computing	2017, Spring
Simons visitor at National Centre for Biological Sciences, India	2014 – Current

AWARDS

Ramanujan Fellow	2014 – 2019
Krell Institute Computational Science Graduate Fellow	2006 – 2010

ADVISING

Suprovat Ghoshal (Ph.D.)	2015 – Present
Arshed Nabeel (Ph.D., coadvised with Prof. Sridharan Devarajan)	2015 – Present
Palash Dey (Ph.D.)	2013 – Present
Kirankumar Shiragur (M.Sc. → Microsoft Research India → Stanford University)	2013 – 2015
Ameet Gadekar (M.Sc. → Citrix)	2013 – 2015
Chetan Gupta (M.Sc.)	2013 – 2016

TEACHING EXPERIENCE

Indian Institute of Science	
Lecturer – Randomized Algorithms	**Spring 2016**
Indian Institute of Science	
Lecturer – Approximation Algorithms	**Spring 2015**
Indian Institute of Science	
Lecturer – Design and Analysis of Algorithms	**Fall 2013-16**
Indian Institute of Science	
Lecturer – Expander Graphs and Applications	**Spring 2014**
Massachusetts Institute of Technology	
Teaching Assistant for various undergraduate and graduate classes	**2005-2010**

PROFESSIONAL ACTIVITIES

- Steering committee member of the NMI Thematic Program on Complexity and Cryptography (2016-17)
- Organizer for FSTTCS 2015 workshop, "FOURIER"
- Co-organizer for the Indo-US Symposium on Learning, Algorithms and Complexity, 2015
- Co-organizer for FOCS 2014 workshop, "Higher-order Fourier Analysis"
- Co-founder of the Big Data Initiative at CSA, IISc.
- Program Committee member: *XRCI Open 2015, FSTTCS 2013, SODA 2016, KDD 2016, AAMAS 2017*.
- Reviewer for conferences and journals such as: *IEEE Foundations of Computer Science, ACM Symposium on Theory of Computing, SIAM Symposium on Discrete Algorithms, Conference on Computational Complexity, European Symposium on Algorithms, SIAM Journal on Computing, IEEE Transactions on Information Theory*, etc.
- Invited speaker at: *IBM I-CARE Conference, Simons Institute for Theory of Computing, International Centre for Theoretical Sciences, Indo-Swiss School on Algorithms and Complexity, Bertinoro International Center for Informatics, Young Investigator Meeting at Boston, Microsoft Research Silicon Valley, Stanford University, Technion, Chinese University of Hong Kong, Institute for Advanced Study, Haifa University, INFORMS Annual Meeting, Dagstuhl Center for Informatics, IIT Kanpur, IBM T.J. Watson Research Center*, etc.

INDUSTRIAL COLLABORATION

- Consultant for the data analytics team at Shell Technology Center, 2015-16.
- Collaboration with Tata Consultancy Services Innovation Labs, Cincinnati/Bangalore, 2016-Present.

CONFERENCE AND JOURNAL PUBLICATIONS

Higher-order Fourier Analysis over non-prime fields (with A. Bhowmick and C. Gupta)
Proc. International Workshop on Randomization and Computation, 2016.

On the hardness of learning sparse parities (with A. Gadekar, S. Ghoshal and R. Saket)
Proc. European Symposium on Algorithms, 2016.

Lower bounds for constant query affine-invariant LCC's and LTC's (with S. Gopi)
Proc. Computational Complexity Conference, 2016.
ACM Transactions on Computation Theory, to appear.

Optimal algorithms for heavy hitters in insertion streams and related problems (with P. Dey and D. Woodruff)
Proc. Principles of Database Systems, 2016.

How friends and non-determinism affect opinion dynamics (with K. Shiragur)
Proc. Conference on Decision and Control, 2015.

Sample Complexity for Winner Prediction in Elections (with P. Dey)
Proc. Conference on Autonomous Agents & Multiagent Systems, 2015.

Algorithmic Regularity for Polynomials and Applications (with P. Hatami and M. Tulsiani)
Proc. Symposium on Discrete Algorithms, 2015.

Polynomial decompositions in polynomial time
Proc. European Symposium on Algorithms, 2014.

On Testing Affine-Invariant Properties
Invited column on ACM SIGACT News, vol. 44, no. 4, 2013.

A bipartite graph with non-unimodal independent set sequence (with J. Kahn)
Electronic Journal of Combinatorics, vol. 20, no. 4, 2013.

Every locally characterized affine-invariant property is testable (with E. Fischer, H. Hatami, P. Hatami, S. Lovett)
Proc. ACM Symposium on Theory of Computing, 2013.

On the convergence of the Hegselmann-Krause system (with M. Braverman, B. Chazelle, H. Nguyen)
Proc. Innovations in Theoretical Computer Science, 2013.

An Algebraic Characterization of Testable CSPs (with Y. Yoshida)
Proc. International Colloquium on Automata, Languages and Programming, 2013.

Testing Low Complexity Affine-Invariant Properties (with E. Fischer, S. Lovett)
Proc. SIAM Symposium on Discrete Algorithms, 2013.

Testing Permanent Oracles – Revisited (with S. Arora, R. Manokaran, S. Sachdeva)
Proc. Intl. Workshop on Randomization and Computation, 2012.

Testing Odd-Cycle Freeness in Boolean Functions (with E. Grigorescu, P. Raghavendra, A. Shapira)
Proc. SIAM Symposium on Discrete Algorithms, 2012.
Combinatorics, Probability & Computing, vol. 21, no. 6, 2012.

Tight lower bounds for linear 2-query locally correctable codes over finite fields (with Z. Dvir, S. Saraf, A. Shpilka)
Proc. IEEE Foundations of Computer Science, 2011.
Combinatorica, vol. 36, no. 1, 2016.

Approximation algorithms for spanner problems and directed Steiner forest (with P. Berman, K. Makarychev, S. Raskhodnikova, G. Yaroslavtsev)
Proc. Intl. Colloquium on Automata, Languages and Programming, 2011.
Invited to special issue of Information and Computation, vol. 222, 2013.

Steiner transitive-closure spanners for low-dimensional posets (with P. Berman, E. Grigorescu, S. Raskhodnikova, D. Woodruff, G. Yaroslavtsev)
Proc. Intl. Colloquium on Automata, Languages and Programming, 2011.
Combinatorica, vol. 34, no. 3, 2014.

The Complexity of Linear Dependence Problems in Vector Spaces (with P. Indyk, D. Woodruff, N. Xie)
Proc. Innovations in Computer Science, 2011.

Testing Monotonicity of distributions over general partial orders (with E. Fischer, R. Rubinfeld)
Proc. Innovations in Computer Science, 2011.

A Unified Framework for Testing Linear-Invariant Properties (with E. Grigorescu, A. Shapira)
Proc. Foundations of Computer Science, 2010.
Random Structures & Algorithms, vol. 46, no. 2, 232-260, 2012.

Optimal Testing of Reed-Muller Codes (with S. Kopparty, G. Schoenebeck, M. Sudan, D. Zuckerman)
Proc. Foundations of Computer Science, 2010.

Lower Bounds for Monotonicity Reconstruction from Transitive-Closure Spanners (with E. Grigorescu, M. Jha, K. Jung, S. Raskhodnikova, D. Woodruff)
Proc. Intl. Workshop on Randomization and Computation, 2010.
SIAM Journal of Discrete Mathematics, vol. 26, no. 2, 2012.

Lower Bounds for Testing Triangle-freeness in Boolean Functions (with N. Xie)
Proc. SIAM Symposium on Discrete Algorithms, 2010.

Testing Linear-Invariant Non-linear Properties (with V. Chen, M. Sudan, N. Xie)
Proc. Symposium on Theoretical Aspects of Computer Science, 2009.
Theory of Computing, vol. 7, no. 1, 2011.

Transitive Closure Spanners (with E. Grigorescu, K. Jung, S. Raskhodnikova, D. Woodruff)
Proc. SIAM Symposium on Discrete Algorithms, 2009.
SIAM Journal of Computing, vol. 41, no. 6, 2012.

BOOKS

Property Testing (with Y. Yoshida)
In preparation, 2016.