

MICHAEL A. FORBES

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Research Interests

Theoretical Computer Science, Complexity Theory, Algebra and Computation,
Pseudorandomness

Education

- MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT) 2009–Present
- ◇ S.M. in Electrical Engineering and Computer Science, 2011.
 - ◇ Pursuing a PhD in Computer Science, focusing in theoretical computer science under Prof. Scott Aaronson. (Graduate) GPA is 5 out of 5.
- MIT 2005–2009
- ◇ Bachelors of Science in Mathematics. GPA is 4.9 out of 5, 4.9 in major.
- MONTGOMERY BLAIR HIGH SCHOOL (MBHS) 2001–2005
- ◇ Mathematics, Science and Technology Magnet Program. Graduated with a GPA of 3.96 out of 4.

Positions

- VISITING STUDENT Summer 2011
- ◇ Visited Stanford University.
- RESEARCH INTERN Summer 2010
- ◇ Microsoft Research India
 - ◇ Studied a polynomial-method approach to derandomizing algorithms in number theory, under Neeraj Kayal.
- UNDERGRADUATE RESEARCHER Summer 2008
- ◇ MIT, Computer Science and Artificial Intelligence Lab
 - ◇ Studied the complexity of a previously unstudied decision problem concerning functions of a finite set into itself, showed the problem was PSPACE-complete. Work done under Prof. Scott Aaronson.
- MATHEMATICS RESEARCHER 2006–2009
- ◇ National Institute of Standards and Technology (NIST)
 - ◇ Summer Undergraduate Research Fellowship (SURF), Summers of 2006 and 2007
 - ◇ Math and Computational Sciences Division Guest Researcher, Fall 2007–2009

Date: April 10, 2012.

- ◇ Significantly improved an existing algorithm for generating Covering Arrays under Dr. James Lawrence and Dr. Raghu Kacker.

RESEARCH ASSISTANT July 2005–Present (sporadically)

- ◇ Created Perl programs for processing space-weather data to allow correlation analysis to electricity prices. Work done under Prof. Kevin Forbes, who was supported by NSF Grant ATM-0318582.

RESEARCH INTERN Summer 2005

- ◇ Explored use of mathematics in design theory under Dr. Ram Sriram.

ALGORITHMS RESEARCHER Summer 2004

- ◇ University of Maryland, College Park
- ◇ Investigated approximation algorithms for a variant of the Traveling Salesman Problem under Prof. Samir Khuller.

WEB PROGRAMMER Summer 2003

- ◇ National Aeronautics and Space Administration, Goddard Space Flight Center
- ◇ Created a Procedure Revision System for satellite testing using PHP/MySQL under Dr. Richard Wesenberg.

SYSTEMS ADMINISTRATOR 2003–2005

- ◇ MBHS
- ◇ Maintained and upgraded email, web, DNS, dial-in, and groupware servers under Peter Hammond, User Support Specialist.

Teaching

18.404/6.860: INTRODUCTION TO THE THEORY OF COMPUTATION Fall 2010, 2011

- ◇ Teaching Assistant to Prof. Michael Sipser
- ◇ Undergraduate/Graduate class
- ◇ Enrollment: 72, 75
- ◇ Overall Student Rating: 6.6/7, 6.2/7

18.404/6.860: INTRODUCTION TO THE THEORY OF COMPUTATION Fall 2009

- ◇ Grader for Prof. Michael Sipser

18.03: INTRODUCTION TO DIFFERENTIAL EQUATIONS Spring 2006

- ◇ Grader for Prof. Haynes Miller

Professional Activities

- ◇ Referee for the *Journal of the Association for Computing Machinery*.
- ◇ Referee for the *Symposium on the Theory of Computation*, 2012.
- ◇ Referee for the *Conference on Computational Complexity*, 2012.
- ◇ Organizer of the MIT Theory Group's Weekly Tea, Fall 2010–Spring 2011.
- ◇ Organizer of the MIT Theory Group Introductory Theory Seminar, 2010.
- ◇ Proofreader for *Foundations and Trends in Theoretical Computer Science*.
- ◇ Proofread Oded Goldreich's *P, NP, and NP-Completeness: The Basics of Computational Complexity*.
- ◇ Member of Association of Computing Machinery, and special interest group SIGACT.

Papers

- ◇ Michael A. Forbes, Amir Shpilka. *On Identity Testing of Tensors, Low-rank Recovery and Compressed Sensing*. Proceedings of the 2012 ACM 44th Symposium on the Theory of Computing.
- ◇ Alessandro Chiesa, Michael A. Forbes. *Improved Soundness for QMA with Multiple Provers*. [arXiv:1108.2098](#). Submitted.
- ◇ Michael A. Forbes, Neeraj Kayal, Rajat Mittal, Chandan Saha. *Square root Bound on the Least Power Non-residue using a Sylvester-Vandermonde Determinant*, [arXiv:1104.4557](#)
- ◇ Boris Alexeev, Michael A. Forbes, Jacob Tsimerman. *Tensor Rank: Some Upper and Lower Bounds*. Proceedings of the 2011 IEEE 26th Annual Conference on Computational Complexity.
- ◇ Michael Forbes, Jim Lawrence, Yu Lei, Raghu N. Kacker, and D. Richard Kuhn, *Refining the in-parameter-order strategy for constructing covering arrays*, Journal of Research of the National Institute of Standards and Technology **113** (2008), no. 5, 287–297.

Talks

- ◇ On Identity Testing of Tensors, Low-rank Recovery and Compressed Sensing. Microsoft Research New England. October 14, 2011
- ◇ Tensor Rank: Some Upper and Lower Bounds. Conference on Computational Complexity. June 10, 2011
- ◇ Tensor Rank: Some Upper and Lower Bounds. Microsoft Research New England. February, 2011.
- ◇ Some Tensor-Rank Lower-Bounds. Microsoft Research India Seminar. July 14, 2010.
- ◇ Some Tensor-Rank Lower-Bounds. Microsoft Research New England. March 12, 2010.
- ◇ NIST Summer Undergraduate Research Colloquium, Plenary speaker representing the Information Technology Lab for research done under Dr. James Lawrence, August 8, 2006 and August 7, 2007.

Awards

- ◇ Siebel Scholar 2011
- ◇ National Science Foundation, Graduate Research Fellowship Program, Honorable Mention, 2011
- ◇ Putnam Exam Participant 2006 (Rank of 747th out of 3640), 2007 (Rank of 707th out of 3753), and **Honorable Mention** in 2008 (Rank of 61st out of 3627)
- ◇ **Intel Science Talent Search Finalist** for algorithmic research under Prof. Khuller, 2005
- ◇ USA Computer Olympiad, Gold Division, 2003–2005