

Prahladh Harsha

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RESEARCH INTERESTS

Computational Complexity, Probabilistically Checkable Proofs (PCPs), Information Theory, Property Testing, Proof Complexity, Communication Complexity.

EDUCATION

- **Doctor of Philosophy (PhD)**
Computer Science, Massachusetts Institute of Technology, 2004
Research Advisor : Professor Madhu Sudan
PhD Thesis: *Robust PCPs of Proximity and Shorter PCPs*
- **Master of Science (SM)**
Computer Science, Massachusetts Institute of Technology, 2000
- **Bachelor of Technology (BTech)**
Computer Science and Engineering, Indian Institute of Technology, Madras, 1998

WORK EXPERIENCE

- **Toyota Technological Institute, Chicago** September 2004 – Present
Research Assistant Professor
- **Technion, Israel Institute of Technology, Haifa** February 2007 – May 2007
Visiting Scientist
- **Microsoft Research, Silicon Valley** January 2005 – September 2005
Postdoctoral Researcher

HONOURS AND AWARDS

- *Summer Research Fellow 1997*, Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore.
- *Rajiv Gandhi Science Talent Research Fellow 1997*, Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore.
- Award Winner in the *Indian National Mathematical Olympiad (INMO) 1993*, National Board of Higher Mathematics (NBHM).
- National Board of Higher Mathematics (NBHM) Nurture Program award 1995-1998. The Nurture program 1995-1998, coordinated by Prof. Alladi Sitaram, Indian Statistical Institute, Bangalore involves various topics in higher mathematics.

- Ranked 7th in the All India Joint Entrance Examination (JEE) for admission into the Indian Institutes of Technology (among the 100,000 candidates who appeared for the examination).
- Papers invited to special issues
 - “Robust PCPs of Proximity, Shorter PCPs, and Applications to Coding” (with Eli Ben-Sasson, Oded Goldreich, Madhu Sudan, and Salil Vadhan).
Invited to special issue of *SIAM Journal on Computing*, for STOC 2004 (invitation declined).
Invited to *SIAM Journal on Computing*, special issue on Randomness and Computation.

TEACHING EXPERIENCE

- **Probabilistically checkable proofs (Univ. Chicago)** Fall Quarter 2007
Taught a graduate course on probabilistically checkable proofs (PCPs).
- **Expanders (Stanford)** Spring Quarter 2005
Co-taught with Cynthia Dwork, a graduate course on expanders and their applications in Computer Science at the Stanford University.
- **Theory of Computation (MIT)** Fall 2001, 2002, 2003
Teaching assistant for “Theory of Computation (6.840/18.404J)”, a course taught by Prof. Mike Sipser at the Massachusetts Institute of Technology.
- **Advanced Complexity (MIT)** Spring 2003
Teaching assistant for “Advanced Complexity (6.841)”, an advanced graduate course taught by Prof. Madhu Sudan at the Massachusetts Institute of Technology.
- **Introduction to Algorithms (MIT)** Fall 1999, Spring 2000
Teaching assistant for “Introduction to Algorithms (6.046/18.410J)”, a course taught by Professors Michel Goemans and Daniel Spielman (Fall 1999) and Professors Shafi Goldwasser and Silvio Micali (Spring 2000) at the Massachusetts Institute of Technology.

PUBLICATIONS

- **Theses**
 1. **PhD Thesis:** *Robust PCPs of Proximity and Shorter PCPs.*
Massachusetts Institute of Technology, Sep 2004.
Advisor: Prof. Madhu Sudan.
 2. **Master’s Thesis:** *Small PCPs with low query complexity.*
Massachusetts Institute of Technology, May 2000.
Advisor: Prof. Madhu Sudan.
 3. **Undergraduate Thesis:** *Distributed-Automata and Simple Test Tube Systems.*
Indian Institute of Technology, Madras (Chennai), May 1998.
Advisor: Prof. Kamala Krithivasan.
- **Journals**
 1. Eli Ben-Sasson, Oded Goldreich, Prahladh Harsha, Madhu Sudan, and Salil Vadhan. “Robust PCPs of proximity, shorter PCPs and applications to coding.” *SIAM Journal on Computing* (special issue on Randomness and Computation), 36(4):889–974, 2006.
 2. Prahladh Harsha, Yuval Ishai, Joe Kilian, Kobbi Nissim, and Srinivas Venkatesh. “Communication vs. computation.” *Computational Complexity*, 16(1):1–33, 2007.

3. Eli Ben-Sasson, Prahladh Harsha, and Sofya Raskhodnikova. Some 3CNF properties are hard to test. *SIAM Journal on Computing*, 35(1):1–21, 2005.
4. Prahladh Harsha and Madhu Sudan. “Small PCPs with low query complexity.” *Computational Complexity*, 9(3–4):157–201, 2000/2001.
5. Kamala Krithivasan, Sakthi Balan, and Prahladh Harsha. “Distributed processing in automata.” *International Journal of Foundations of Computer Science*, 10(4):443–463, 1999.

• **Conference and Unrefereed Publications**

1. Eli Ben-Sasson, Prahladh Harsha, Oded Lachish, and Arie Matsliah. “Sound 3-query PCPPs are long.” Technical Report TR07–127, Electronic Colloquium on Computational Complexity, 2007.
2. Prahladh Harsha, Tom Hayes, Hariharan Narayanan, Harald Räcke, and Jaikumar Radhakrishnan. “Minimizing average latency in oblivious routing.” In *Proc. 19th ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 200–207, San Francisco, California, 20–22 January 2008.
3. Prahladh Harsha, Rahul Jain, David McAllester, and Jaikumar Radhakrishnan. “The communication complexity of correlation.” In *Proc. 22nd IEEE Conference on Computational Complexity*, pages 10–23, San Diego, California, 13–16 June 2007.
4. Eli Ben-Sasson, Oded Goldreich, Prahladh Harsha, Madhu Sudan, and Salil Vadhan. “Short PCPs verifiable in polylogarithmic time.” In *Proc. 20th IEEE Conference on Computational Complexity*, pages 120–134, San Jose, California, 12–15 June 2005.
5. Prahladh Harsha, Yuval Ishai, Joe Kilian, Kobbi Nissim, and Srinivas Venkatesh. “Communication vs. computation.” In *Proc. 31st International Colloquium of Automata, Languages and Programming (ICALP)*, volume 3142 of *Lecture Notes in Computer Science*, pages 745–756, Turku, Finland, 12–16 July 2004.
6. Eli Ben-Sasson, Oded Goldreich, Prahladh Harsha, Madhu Sudan, and Salil Vadhan. “Robust PCPs of proximity, shorter PCPs and applications to coding.” In *Proc. 36th ACM Symp. on Theory of Computing*, pages 1–10, Chicago, Illinois, 13–15 June 2004.
7. Eli Ben-Sasson and Prahladh Harsha. “Lower bounds for bounded depth Frege proofs via Buss-Pudlak games.” Technical Report TR03–004, Electronic Colloquium on Computational Complexity, 2003.
8. Eli Ben-Sasson, Prahladh Harsha, and Sofya Raskhodnikova. “Some 3CNF properties are hard to test.” In *Proc. 35th ACM Symp. on Theory of Computing*, pages 345–354, San Diego, California, 9–11 June 2003.
9. Prahladh Harsha and Madhu Sudan. “Small PCPs with low query complexity.” In *Proc. 18th Annual Symposium on Theoretical Aspects of Computer Science (STACS)*, volume 2010 of *Lecture Notes in Computer Science*, pages 327–338, Dresden, Germany, 15–17 February 2001.

PROFESSIONAL ACTIVITIES

- Organization Membership: ACM, IEEE
- *Journals refereed:*
Siam Journal of Computing (SICOMP), Theoretical Computer Science (TCS)
- *Conferences refereed:*
ACM Symposium on Theory of Computing (STOC), IEEE Conference on Computational Complexity (CCC), IEEE Symposium on Foundations of Computer Science (FOCS), Symposium on Theoretical Aspects of Computer Science (STACS).

OTHER ACTIVITIES

- Organised the TTI-Chicago Theory Seminar (Fall 2004, Fall 2005, Winter 2005, Fall 2006).

CITIZENSHIP

Citizen of India.

Visa Status in USA: H1-B Work Permit

REFERENCES

- Prof. Madhu Sudan
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Computer Science and Artificial Intelligence Laboratory (CSAIL), MIT
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77 Massachusetts Avenue
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- Prof. Lance Fortnow
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- Prof. Michael Sipser
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- Dr. Eli Ben-Sasson
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