

# MAHDI CHERAGHCHI-BASHI-ASTANEH

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## Research Interests

Theoretical Computer Science, and in particular:

- Interconnections between coding theory and theoretical computer science,
- Derandomization and explicit construction of combinatorial objects,
- Pseudorandomness and extractor theory,
- PCP theory and hardness of approximation.

## Education

- **Swiss Federal Institute of Technology (EPFL)**, Lausanne, Switzerland. (November 2005 – July 2010)  
Ph.D. in Computer Science.  
Dissertation Title: *Applications of Derandomization Theory in Coding*.  
Supervisor: Amin Shokrollahi, Professor.
- **Swiss Federal Institute of Technology (EPFL)**, Lausanne, Switzerland. (October 2004 – July 2005)  
M.Sc. in Computer Science.  
Dissertation Title: *Locally Testable Codes*. (available online in ECCS thesis archive.)  
Supervisor: Amin Shokrollahi, Professor.  
GPA: 5.94 / 6.00 .
- **Sharif University of Technology**, Tehran, Iran. (September 2000 – July 2004)  
B.Sc. in Software Engineering and B.Sc. in Computer Hardware Engineering.  
B.Sc. Dissertation: *Human Face Localization in Still Color Images*.  
Dissertation Advisor: Mansour Jamzad, Associate Professor.  
GPA: 19.06 / 20.00 — Ranked First by the Education Bureau.

## Work Experience

- (September 2011–*present*) Post-doctoral researcher at the Computer Science Department, Carnegie Mellon University (hosted by Prof. Venkatesan Guruswami).
- (October 2010–August 2011) Post-doctoral researcher at the Department of Computer Science, the University of Texas at Austin (hosted by Prof. David Zuckerman).
- (August–October 2009) Internship at Royal Institute of Technology (KTH), Sweden. Research on Hardness of Approximation under supervision of Prof. Johan Håstad.

## Honors, Awards and Distinctions

- (March 2011) Top 7 Doctoral Dissertations of the Year 2011 at EPFL, Switzerland (best theses are recognized annually by the EPFL Research Commission).
- (October 2010) Patrick Denantes Memorial Prize for Outstanding Doctoral Dissertation.
- (May 2010) Swiss National Science Foundation Prospective Researcher (Post-Doctoral) Fellowship.
- (February 2005) Best B.Sc. Graduate Award in Computer Engineering, Sharif University of Technology.
- (May 2004, May 2003) Second (resp. Third) Place, Nationwide Examination for Graduate Admissions in Computer Science, Iran.
- (August 2000) Ranked 115 Among Over 350'000 in the Nationwide Examination for Undergraduate Admissions in the Public Universities, Iran.

## Research Publications

(all publications are available online at <http://mahdi.ch/writings>)

### Journal Papers

- [1] M. Cheraghchi, A. Hormati, A. Karbasi, M. Vetterli. *Compressed Sensing with Probabilistic Tests: Theory, Design and Application*. IEEE Transactions on Information Theory 57(10), pp 7057–7067, 2011. (arXiv:1009.3186, extended version of [11]).
- [2] M. Cheraghchi, A. Karbasi, S. Mohajer, V. Saligrama. *Graph-Constrained Group Testing*. To appear in IEEE Transactions on Information Theory, 2011. arXiv:1001.1445 (extended version of [10]).
- [3] M. Cheraghchi, F. Didier, A. Shokrollahi. *Invertible Extractors and Wiretap Protocols*. To appear in IEEE Transactions on Information Theory, 2011. arXiv:0901.2120 (extended version of [14]).
- [4] M. Cheraghchi, J. Håstad, M. Isaksson, O. Svensson. *Approximating Linear Threshold Predicates*. To appear in ACM Transactions on Computation Theory, 2011. ECCC TR10-132 (extended version of [8]).

### Conference Papers

- [5] M. Cheraghchi, A. Klivans, P. Kothari, H.K. Lee. *Submodular Functions Are Noise Stable*. In Proceedings of the ACM-SIAM Symposium on Discrete Algorithms (SODA 2012). arXiv:1106.0518.
- [6] M. Cheraghchi. *Coding-Theoretic Methods for Sparse Recovery*. In Proceedings of 49th Allerton Conference on Communication, Control and Computing, 2011 (invited paper).
- [7] M. Cheraghchi. *Derandomization and Group Testing*. In Proceedings of 48th Allerton Conference on Communication, Control and Computing, 2010 (invited paper).
- [8] M. Cheraghchi, J. Håstad, M. Isaksson, O. Svensson. *Approximating Linear Threshold Predicates*. In Proceedings of the 13th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX), 2010.
- [9] M. Cheraghchi. *Improved Constructions for Non-adaptive Threshold Group Testing*. In Proceedings of the 37th International Colloquium on Automata, Languages and Programming (ICALP), 2010.
- [10] M. Cheraghchi, A. Karbasi, S. Mohajer, V. Saligrama. *Graph-Constrained Group Testing*. In Proceedings of IEEE International Symposium on Information Theory (ISIT), 2010 (*nominated for the best student paper award*).
- [11] M. Cheraghchi, A. Hormati, A. Karbasi, M. Vetterli. *Compressed Sensing with Probabilistic Measurements: A Group Testing Solution*. In Proceedings of 47th Allerton Conference on Communication, Control and Computing, 2009.
- [12] M. Cheraghchi. *Noise-Resilient Group Testing: Limitations and Constructions*. In Proceedings of 17th International Symposium on Fundamentals of Computation Theory (FCT), 2009.

- [13] M. Cheraghchi. *Capacity Achieving Codes from Randomness Conductors*. In Proceedings of IEEE International Symposium on Information Theory (ISIT), 2009.
- [14] M. Cheraghchi, F. Didier, A. Shokrollahi. *Invertible Extractors and Wiretap Protocols*. In Proceedings of IEEE International Symposium on Information Theory (ISIT), 2009.
- [15] E. Ardestanizadeh, M. Cheraghchi, A. Shokrollahi. *Bit Precision Analysis for Compressed Sensing*. In Proceedings of IEEE International Symposium on Information Theory (ISIT), 2009.
- [16] M. Cheraghchi, A. Shokrollahi. *Almost-Uniform Sampling of Points on High-Dimensional Algebraic Varieties*. In Proceedings of 26th International Symposium on Theoretical Aspects of Computer Science (STACS), 2009.
- [17] M. Cheraghchi, A. Shokrollahi, A. Wigderson. *Computational Hardness and Explicit Constructions of Error Correcting Codes*. In Proceedings of 44th Allerton Conference on Communication, Control and Computing, 2006 (invited paper).

### Technical Reports

- [18] M. Cheraghchi. *On Matrix Rigidity and the Complexity of Linear Forms*. ECCC TR05-070, 2005.

### Theses

- [19] M. Cheraghchi. *Applications of Derandomization Theory in Coding*. Ph.D. Thesis No. 4767, EPFL, Switzerland. arXiv:1107.4709. 2010.
- [20] M. Cheraghchi. *Locally Testable Codes*. M.Sc. Thesis, EPFL, Switzerland. 2005.
- [21] M. Cheraghchi. *Human Face Localization in Still Color Images*. B.Sc. Dissertation (in Persian), Sharif University of Technology, Tehran, Iran. 2004.

### Service

- Associate Editor, International Journal of Information and Coding Theory (11/2011–present).
- Served as external reviewer for
  - Journals: Information Processing Letters (IPL), IEEE Journal on Selected Areas in Communications (JSAC), SIAM Journal on Computing (SICOMP), Discrete Applied Mathematics (DAM), IEEE Transactions on Information Theory (IEEE IT).
  - Conferences: IMA Conference on Cryptography and Coding (2007), International Symposium on Turbo Codes and Related Topics (Turbo 2008), IEEE International Symposium on Information Theory (ISIT 2007, 2008, 2009, 2010, 2011), International Workshop on Randomization and Computation (RANDOM 2011), Symposium on Theoretical Aspects of Computer Science (STACS 2012), Theory of Cryptography Conference (TCC 2012), IEEE Conference on Computational Complexity (CCC 2012).

### Some Research Talks

- Invited lecture at the Institute for Mathematics and Its Applications (IMA) at the University of Minnesota for workshop “Group Testing Designs, Algorithms, and Applications to Biology” (to be held in 02/2012).
- Invited talk at the 2012 Information Theory and Applications (ITA) Workshop, University of California, San Diego, CA (to be hold in 02/2012).
- Invited talk at the Department of Computer Science and Engineering, Pennsylvania State University (11/2011, hosted by Prof. Martin Fürer).
- Invited speaker at the 49th Allerton Conference on Communication, Control and Computing, Allerton Retreat Center, Monticello, Illinois (09/2011).

- “Derandomization Theory and Combinatorial Group Testing”. Invited talk at the 2011 Information Theory and Applications (ITA) Workshop, UC San Diego, CA (02/2011).
- “Derandomization and Group Testing”. Invited talk at the 48th Allerton Conference on Communication, Control and Computing, Allerton Retreat Center, Monticello, Illinois (09/2010).
- “Noise-Resilient Group Testing: Limitations and Constructions” at EPFL (01/2009); Institute for Advanced Study, Princeton (01/2009); MIT CSAIL (01/2009); UC Berkeley (01/2009).
- “Invertible Extractors and Wiretap Protocols” at Princeton University (01/2009); UC San Diego (01/2009).
- “Computational Hardness and Explicit Constructions of Error Correcting Codes” at EPFL (02/2007).

## Teaching Experience

- (2005 – 2009) Teaching Assistant, Swiss Federal Institute of Technology, Lausanne. Courses: Linear Algebra (Winter 2005), Undergraduate algorithms (Summer 2006, Winter 2007, Fall 2009), Graduate algorithms (Winter 2006, Summer 2007), Coding theory (Summer 2009).
- (2001 – 2003) Teaching Assistant, Department of Computer Engineering, Sharif University of Technology. Courses: Design and Implementation of the Programming Languages (Fall 2003), Microprocessors (Spring 2003), Data Structures and Algorithms (Spring 2003), Structured C Programming (Fall 2002), Computer Programming in Pascal (Fall 2001, Spring 2002).

## Computer Skills

- Operating Systems: UNIX family, Microsoft Windows.
- Programming Languages/Environments:
  - Proficient in C++, C, Java, Object Pascal (Delphi Language), and Pascal.
  - Familiar with PHP, Javascript, HTML, SQL, Matlab.
- Digital Typography: Proficient in  $\LaTeX$ .

## References

1. Amin Shokrollahi, Professor, School of Computer and Communication Sciences (IC) and Faculty of Basic Sciences (FSB), Swiss Federal Institute of Technology, Lausanne, Switzerland.  
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2. Johan Håstad, Professor, School of Computer Science and Communication (CSC), Royal Institute of Technology (KTH), Stockholm, Sweden.  
*email:* johanh@csc.kth.se, *phone:* +46(8)790-6289.
3. David Zuckerman, Professor, Department of Computer Science, University of Texas at Austin, TX 78701, USA.  
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4. Venkatesan Guruswami, Associate Professor, Computer Science Department, Carnegie Mellon University, PA 15213, USA.  
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5. Venkatesh Saligrama, Associate Professor, Department of Electrical and Computer Engineering, Boston University, MA 02215, USA.  
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