

PROMOTION RECOMMENDATION  
The University of Michigan  
College of Engineering  
Department of Electrical Engineering and Computer Science

Mahdi Cheraghchi, assistant professor of electrical engineering and computer science, Department of Electrical Engineering and Computer Science, College of Engineering, is recommended for promotion to associate professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.

Academic Degrees:

Ph.D.	2010	EPFL, Computer Science, Lausanne, Switzerland
M.S.	2005	EPFL, Computer Science, Lausanne, Switzerland
B.S.	2004	Sharif University of Technology, Computer Engineering, Tehran, Iran

Professional Record:

2019 – present	Assistant Professor, Department of Electrical Engineering and Computer Science, University of Michigan
2015 – 2019	Lecturer, Department of Computing, Imperial College London, London, United Kingdom
2013 – 2014	Post-Doctoral Fellow, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, Cambridge, MA
2011 – 2013	Post-Doctoral Fellow, Computer Science Department, Carnegie Mellon University, Pittsburgh, PA
2010 – 2011	Post-Doctoral Associate, Department of Computer Science, University of Texas at Austin, Austin, TX

Summary of Evaluation:

Teaching: Professor Cheraghchi is an outstanding teacher, advisor, and mentor. He recently graduated two Ph.D. students, both of whom started with him at and received degrees from Imperial College London. He has successfully recruited four new Ph.D. students to Michigan, and he has also advised five master's students and twelve undergraduates in research. In his first two years he taught undergraduate cryptography (EECS 475) twice, and graduate courses of his own design (numbered as EECS 598 special topics) twice. One of them, Randomness and Computation, is soon to become a permanent CSE course offering: EECS 572. His teaching evaluations are consistently very good (especially for theory courses), with instructor quality (measured by Q2 or the new composite) always at 4.7 or higher.

Research: Professor Cheraghchi's research portfolio, unusually broad for a computer science theorist, includes: (1) coding theory and coding theory in algorithms; (2) computational complexity; (3) sparse data processing and recovery; and (4) information-theoretic cryptography. He is best known for work at the intersection of CS theory and information theory, most strikingly his results characterizing the capacity of deletion channels. His sole-authored paper at the 2018 Symposium on Theory of Computing (STOC) and extended in a 2019 *Journal of the*

*ACM* article, settled a long-standing problem in coding theory. This breakthrough achievement was mentioned, and lauded, in most faculty letters received. External reviewers unequivocally endorse Professor Cheraghchi's promotion and tenure. Since joining Michigan, Professor Cheraghchi has been awarded two NSF grants, a single-PI Small grant and part of a multi-PI Medium grant. He has been awarded one U.S. patent on coding for data storage and has another U.S. patent pending on coded trace reconstruction, related to his work on the deletion channel.

Recent and Significant Publications:

- M. Cheraghchi, V. Nakos, "Combinatorial Group Testing Schemes with Near-Optimal Decoding Time," *61st Annual IEEE Symposium on Foundations of Computer Science (FOCS)*, 2020.
- M. Cheraghchi, "Capacity Upper Bounds for Deletion-Type Channels," *Journal of the ACM (JACM)*, 66(2):9, 2019.
- M. Cheraghchi, J. Ribeiro, "Improved Upper Bounds and Structural Results on the Capacity of the Discrete-Time Poisson Channel," *IEEE Transactions on Information Theory*, 65(7), pp. 4052–4068, 2019.
- M. Cheraghchi, P. Indyk, "Nearly Optimal Deterministic Algorithm for Sparse Walsh-Hadamard Transform," *ACM Transactions on Algorithms (TALG)*, 13(3), pp. 1–36, 2017.
- M. Cheraghchi, V. Guruswami, "Capacity of Non-Malleable Codes," *IEEE Transactions on Information Theory*, 62(3), pp. 1097–1118, 2016.

Service: Professor Cheraghchi has an excellent record of internal and external service. Internally, he has served on the CSE Graduate Admissions Committee, the Tenure Track Search Committee, and the DEI Committee. He has served as a mentor to graduate students, including underrepresented minorities, in the Explore CS Research program, and externally at the 2020 Rising Stars Workshop (a workshop for women in EECS). He has also taken a special interest in DEI issues and improving CSE culture overall and has become a strong advocate for the interests of international students. Externally, Professor Cheraghchi regularly serves on numerous technical program committees at various top venues in his field, including the prestigious STOC and FOCS conferences. He has organized and led workshops, including the 2015 DIMACS workshop on Coding Theoretic Methods for Network Security; served on several NSF panels; and is an external reviewer for dozens of top venues.

External Reviewers:

Reviewer A: "Prof. Mahdi Cheraghchi has done outstanding work that has gained the stature, general reputation, and quality commensurate with a position of Associate Professor with tenure at any top University."

Reviewer B: "His work was the first hope I've had that the fundamental problem of determining the Shannon capacity of the deletion channel might be resolved. He achieved better bounds than previous work, and his methodology provided remarkable insights into the probability distributions that can lead to capacity-achieving codebooks. Given this outstanding start, I think resolving this problem, one of the great remaining theoretical problems in information theory, is possible, and Mahdi is most likely to be the one to do it."

Reviewer C: “I would personally be thrilled to have Mahdi as my own tenured colleague and reiterate my support for his promotion.”

Reviewer D: “Mahdi is one of the world’s experts in sparse recovery (and in particular group testing) and he has made many important contributions. His funding, teaching and service records are all way beyond adequate. In my mind, it is a clear-cut case for Mahdi to be appointed as an Associate Professor (with tenure) in your department.”

Reviewer E: “I would put Mahdi comfortably in the top 25% of theoretical computer scientists at top academic institutions who are at the same career level ... Looking through his record, it is clear that his achievements in other areas such as teaching and service are substantial as well. I am especially impressed by his efforts towards increasing diversity and inclusion. In short, I strongly recommend Mahdi for tenure at your institution.”

Reviewer F: “Dr. Cheraghchi’s research profile in terms of publication quality, quantity and citations is also truly outstanding with a few peaks of excellence as highlighted above. His research is well supported by a couple of mid- to large-sized grants currently. I expect to see him make many more stunning breakthroughs in information theory and TCS in the near future. I strongly and unreservedly recommend Dr. Cheraghchi for promotion to Associate Professor with tenure at the University of Michigan.”

Summary of Recommendation: Professor Cheraghchi is an established leader in theoretical computer science with demonstrated leadership in teaching, research, and service. It is with the support of the College of Engineering Executive Committee that I recommend Mahdi Cheraghchi for promotion to associate professor of electrical engineering and computer science, with tenure, Department of Electrical Engineering and Computer Science, College of Engineering.



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Alec D. Gallimore, Ph.D.  
Robert J. Vlasic Dean of Engineering  
College of Engineering

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