

AmirPouya Moeini

PhD student in Engineering @ University of Cambridge

✉ sam297@cam.ac.uk pouya-moeini pouyamoeini.github.io

Research Interests

I am broadly interested in problems at the intersection of **information theory**, **high-dimensional probability**, and **combinatorics**. My PhD focuses on the fundamental asymptotic limits of communication, using tools from probabilistic combinatorics, with a particular focus on mismatched and universal settings.

Education

Ph.D. in Engineering

⌚ Oct 2023 – Ongoing

University of Cambridge, UK — Probabilistic Systems, Information, and Inference Group (PSI²)

Supervisor: Prof. Albert Guillén i Fàbregas

B.Sc. in Computer Engineering (Minor in Applied Mathematics)

⌚ Sep 2018 – Jun 2023

Sharif University of Technology, Iran

Thesis: *Information-theoretic understanding of online learning*

Publications

Two-Class Joint Source-Channel Coding: Expurgated Exponents with i.i.d. Distributions

[Link]

Moeini, A. and Guillén i Fàbregas, A., 2026 International Zurich Seminar on Information and Communication (IZS)

Dual-Domain Exponent of Maximum Mutual Information Decoding

[Link]

Moeini, A. and Guillén i Fàbregas, A., 2025 IEEE Information Theory Workshop (ITW)

Class-Based Expurgation Attains Csiszár's Expurgated Source-Channel Exponent

[Link]

Moeini, A. and Guillén i Fàbregas, A., 2025 IEEE Information Theory Workshop (ITW)

Academic Visits

National University of Singapore, Singapore

October 2025

School of Computing – Institute of Data Science, visiting Dr. Jonathan Scarlett

University of Brescia, Brescia, Italy

September 2025

Department of Information Engineering, visiting Dr. Marco Dalai

Honours and Awards

2023	Cambridge International Trust Full-Scholarship	Cambridge, UK
2022	Summer @ Aalto University Fellowship	Espoo, Finland
2018	Gold Medal 12th International Olympiad on Astronomy and Astrophysics (IOAA)	Beijing, China
2017	Gold Medal 13th National Astronomy and Astrophysics Olympiad	Iran
2017 – Present	Member of the Iran National Elites Foundation	Iran

Teaching Experience

Supervision University of Cambridge

- Information Theory and Coding (3F7), Michaelmas 24, 25 • Data Transmission (3F4), Lent 25, 26

Teaching Assistant Sharif University of Technology

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|---------------------------------------------|-----------------------------------------------|
| • Information theory & Coding *, Fall 22 | • Data Structure & Algorithm, Spring 21 |
| • Theoretical Machine learning *, Fall 22 | • Linear algebra, Spring 21 |
| • Statistical Machine learning *, Spring 22 | • Regression Analysis, Spring 21 |
| • Mathematical Statistics, Fall 21 | • Artificial intelligence, Fall 21, Spring 22 |

*: Graduate-level Course

Research Experience

Approximate Bayesian Computation in the Presence of Outliers

⌚ Jul 2022 – Oct 2022

- Probabilistic Machine Learning Group, Aalto University, Finland
- Supervisor: *Prof. Samuel Kaski*.

- Developing computationally efficient algorithms that enhance the robustness of Approximate Bayesian Computation (ABC) inference under outliers and model misspecification.

Information-Theoretic Bounds for Online Learning Problems

⌚ Oct 2021 – Mar 2023

- Machine Learning Laboratory, Sharif University of Technology, Iran
- Supervisors: *Dr. Mahdieh Soleymani* and *Dr. Hassan Hafez-Kolahi*.

- Deriving information-theoretic bounds for online learning is challenging because the data are assumed to be distribution-free and adversarial. We develop new techniques that allow online learning problems to be analyzed using information-theoretic tools, and we establish performance upper bounds based on conditional mutual information.

Skills

Programming Language: Python (*advanced*), Java (*advanced*), C / C++, SQL.

Statistical Programming Languages: R (*advanced*), Stata, MatLab & Octave, Julia.

Tools and Software: MS Excel, L^AT_EX, Jupyter NB / G Colab, PyTorch, Git / GitHub

Language: Farsi/Persian (*native*), English (*fluent*), French (*basic*).