

AmirPouya Moeini

PhD student in Engineering @ University of Cambridge

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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

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|----------------|---|----------------|
| 2023 | Cambridge International Trust Full-Scholarship | Cambridge, UK |
| 2022 | Summer @ Aalto University Fellowship | Espoo, Finland |
| 2018 | Gold Medal <i>12th International Olympiad on Astronomy and Astrophysics (IOAA)</i> | Beijing, China |
| 2017 | Gold Medal <i>13th National Astronomy and Astrophysics Olympiad</i> | 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

- Information theory & Coding *, Fall 22
- Theoretical Machine learning *, Fall 22
- Statistical Machine learning *, Spring 22
- Mathematical Statistics, Fall 21
- Data Structure & Algorithm, Spring 21
- Linear algebra, Spring 21
- Regression Analysis, Spring 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, \LaTeX , Jupyter NB / G Colab, PyTorch, Git / GitHub

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