

Ilia Mahrooghi

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EPFL & Apple

Lausanne, Switzerland | Born 2003

Research Interests

Broad: Machine Learning, Deep Learning, Natural Language Processing

Specific: Reasoning in LMs, Agentic Reasoning, RL for Reasoning, and Data Contamination

My research centers on reasoning in language models: how to strengthen it through reinforcement learning, and how it extends to agentic settings where models reason over multiple steps and call external tools. I am also interested in data contamination, which is central to distinguishing genuine reasoning from cases where a model has simply memorized the solution.

Education

EPFL

PhD student in Computer Science

Advisors: Prof. Emmanuel Abbe & Prof. Antoine Bosselut

2025 – Present

Lausanne, Switzerland

Sharif University of Technology

B.Sc. in Computer Engineering

2021 – 2025

Tehran, Iran

Young Scholars Club

IMO Preparation Course

Prepared for the International Mathematics Olympiad (IMO).

2020 – 2021

Tehran, Iran

Work Experience

Apple, MLR team

Independent Contractor

Researching reasoning in large language models, with one direction on agentic LLMs for multi-step problem solving and tool use.

Oct 2026 – Present

Lausanne, Switzerland

Hermes Capital

Financial Data Scientist

Built a regime-change detection framework for global markets and a portfolio decomposition model inferring hidden basket weights from NAV, market price, and constituent prices.

2025

Tehran, Iran

Publications

The Scar of RL: Membership Inference Attack for Reasoning Models

Ilia Mahrooghi, Emmanuel Abbe, Antoine Bosselut

Preprint

Goldilocks RL: Tuning Task Difficulty to Escape Sparse Rewards for Reasoning

Ilia Mahrooghi, Aryo Lotfi, Emmanuel Abbe

Preprint

[arXiv](#)

Multi-armed Bandits with Missing Outcome

Ilia Mahrooghi, Mahshad Moradi, Sina Akbari, Negar Kiyavash

Accepted to the 41st Conference on Uncertainty in Artificial Intelligence (UAI 2025)

[arXiv](#)

Research Projects

PhD Research – SCAR

EPFL

Showed that reinforcement learning for language models drives measurable effects along multiple dimensions (Self-sharpening, text Collapse, Answer saturation, and Rollout-sharpening) and demonstrated that **aggregating these fingerprints** yields the strongest approach to **membership inference for RL-trained models**, outperforming any single signal in isolation.

2026

Lausanne, Switzerland

PhD Research – Goldilocks

EPFL

2025 – 2026

Lausanne, Switzerland

Developed a **scalable curriculum RL framework for long data streams**, in which a learned teacher continuously selects informative prompts near a 50% pass rate for GRPO training, suppressing zero-variance gradients and cutting compute by up to **78%**.

Bachelor Research Internship

Summer@EPFL

Summer 2024

Lausanne, Switzerland

Developed algorithms for **Multi-Armed Bandits with missing outcomes** under MCAR, MAR, and MNAR settings, deriving regret bounds for UCB-based methods and extending the framework to missing mediators.

Bachelor Research Internship

Max Planck Institute for Informatics

Summer 2023

Remote

Supervised by: Prof. Corinna Coupette, Prof. Sebastian Dalleiger.

Developed a **GNN for graph isomorphism** using port-numbering and line-graph representations, outperforming Weisfeiler–Lehman-based methods on synthetic and real-world graphs.

Achievements

<i>EPFL Computer Science Doctoral (EDIC) Fellowship</i>	2025
<i>Bronze medal – International Mathematical Olympiad (IMO), Saint Petersburg, Russia</i>	2021
<i>Silver medal – Asian Pacific Mathematical Olympiad (APMO), Indonesia</i>	2021
<i>Silver medal – ELMO Mathematical Olympiad, USA MOP</i>	2021
<i>Gold medal (twice) – Silk Road Mathematical Olympiad, Kazakhstan</i>	2020 & 2021
<i>Gold medal (Rank 1) – Iran National Mathematical Olympiad</i>	2020
<i>Gold medal (national & international) – Iranian Geometry Olympiad</i>	2018 & 2020
<i>First Prize (twice) – European Mathematical Olympiad Cup, Croatia</i>	2018 & 2019
<i>Silver medal – Tuymaada Mathematical Olympiad, Russia</i>	2019

Summer Schools

CMMRS Pre-doctoral Research School in Computer Science

August 2024

Cornell, Maryland, Max Planck Pre-doctoral Research School

Saarbrücken, Germany

Selective research school jointly organized by Cornell University, the University of Maryland, and the Max Planck Institutes, with lectures spanning machine learning, systems, and algorithms.

Teaching Experience

Doctoral Teaching Assistant

EPFL

2025 – Present

Lausanne, Switzerland

Practice of Object-Oriented Programming (2025) · Applied Data Analysis (2026)

Volunteer Teaching Assistant

Sharif University of Technology

2022 – 2025

Tehran, Iran

Artificial Intelligence (3 semesters) · Discrete Structures (2 semesters) · Machine Learning (1 semester) · Design of Algorithms (1 semester) · Advanced Programming (1 semester) · Fundamentals of Programming (1 semester) · Logic Design (1 semester)

Iran Mathematical Olympiad (Unpaid and Volunteered)

Young Scholars Club

2021 – 2022

Tehran, Iran

Taught geometry, combinatorics, number theory to IMO candidates; 3 of them achieved IMO gold medals.

Service & Talks

Reviewer, ICLR 2027.

Reviewer, Conference on Uncertainty in Artificial Intelligence (UAI) 2026.

Lectures: Delivered training lectures to Iran's International Mathematical Olympiad (IMO) candidates.