

Ouail Kitouni

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Education

- 2019–Present **Massachusetts Institute of Technology**, *Ph.D. Candidate*, Physics, Statistics, and Data Science joint degree, Nuclear and Particle Experimental Physics Division and The MIT Statistics and Data Science Center
- 2017–2019 **University of Rochester**, *Bachelor of Science with Highest Distinction*, Physics *GPA: 4.00/4.00* / Mathematics *GPA: 4.00/4.00*

Experience

- 2024 Winter **FAIR**, *Research Scientist Intern*, Meta AI - Fundamental AI Research, NYC
- 2023 Summer **MSR**, *Research Intern*, Microsoft Research, Cambridge UK
- 2022 Summer **FDL**, *ML Researcher Intern*, The NASA/SETI Frontier Development Lab
- 2021–Present **IAIFI**, *Junior Investigator*, The NSF AI Institute for Artificial Intelligence and Fundamental Interactions
- 2019–Present **LHCb**, *Ph.D. Researcher*, Large Hadron Collider, European Center for Nuclear Research (CERN)
- 2018–2019 **DESI**, *Undergraduate Researcher*, Dark Energy Spectroscopic Instrument Collaboration

Selected Publications

- [1] “*Foundation Models of Knowledge I: Diffusion Over Structured Heterogenous Types*”, **ICLR 2024** (pending).
- [2] “*NuCLR: Nuclear Co-Learned Representations*”, Synergy of Scientific & ML Modeling, **ICML 2023**.
- [3] “*Expressive Monotonic Networks*”, **ICLR 2023**.
- [4] “*Towards Understanding Grokking: An Effective Theory of Representation Learning*”, **NeurIPS 2022 Oral**.
- [5] “*NEEMo: Geometric Fitting using a Neural Estimation of the Energy Mover’s Distance*”, Machine Learning and the Physical Sciences **NeurIPS 2022**.
- [6] “*Robust and Provably Monotonic Networks*”, ML and the Physical Sciences **NeurIPS 2021**, (JMLST).
- [7] “*Controlling Classifier Bias with Moment Decomposition: a method to enhance searches for resonances*”, **Journal of High Energy Physics** 10.1007/JHEP04(2021)07 and the Workshop on ML and Physical Sciences **NeurIPS 2020**.
- [8] “*Lower Bounds for the Laplacian Spectral Radius of an Oriented Hypergraph*”, **Australasian Journal of Combinatorics**. 74(3). 408-422.

Honors and Awards

- 2019 **Frank Fellowship**, Awarded to a selection of incoming first-year doctoral students.
- 2017–2019 **Dean’s List**, Awarded based on GPA
- 2017–2019 **Whipple Science and Research Scholarship**, Awarded based on academic and research excellence.
- 2018 **U of R Research Presentation Award**, For presenting excellent research at academic conferences.
- 2015–2017 **Dean’s List**, Awarded based on GPA.
- 2017 **Bailey Scholarship**, Awarded to one outstanding student across the departments of physics, mathematics, chemistry, and biology.
- 2017 **Harvard House Award**, Awarded to top student in the Physics department.
- 2017 **Interdisciplinary Award**, Awarded to top student interested in interdisciplinary research in applied mathematics.
- 2015–2017 **Honors Scholarship**, Merit scholarship awarded to top incoming first-year students every fall semester.
- 2016–2017 **Integration Bee Gold Medal**, Competition at SUNY Brockport’s Mathematics department (2016/2017).
- 2014 **Cirta-Science 1st Place**, High school science competition in Algeria.

Languages Native Level Arabic, French, English