

ÖMER ÜNLÜSOY

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EDUCATION

Master's in Physics <i>M1 & M2 ICFP Physics, Theoretical Physics Track</i> École Normale Supérieure - PSL M1 ICFP Grade: 12.89/20, PSL Fellowship	2023 – present Paris, France
Bachelor of Science <i>Physics</i> Bilkent University GPA: 3.52/4.0, Magna Cum Laude, Comprehensive 100% Scholarship, 6 High Honours & 2 Honours	2019 – 2023 Ankara, Turkey
Bachelor of Science <i>Computer Engineering</i> Bilkent University GPA: 3.59/4.0, Comprehensive 100% Scholarship	2018 – 2023 Ankara, Turkey

SKILLS & ABILITIES

Languages

- Turkish (Native)
- English (Fluent, IELTS: 7.5)

Programming Languages

- Python, C++, Java, Mathematica, MATLAB, \LaTeX , C

RELEVANT EXPERIENCES

M1 Internship on Unruh Effect in Tripartite Diamond Coordinates <i>LPENS</i> Research Advisor: Dr. Giuseppe Policastro I proposed a conformal transformation to obtain tripartite version of Diamond Coordinates that separates the three wedges. I calculated the 6 Bogolubov coefficients for the two dimensional massless scalar field for the Tripartite Diamond Coordinates. From these coefficients, I demonstrated the Unruh effect, derived the Diamond temperature for the causal diamond and the Unruh temperature for the wedges.	March – July 2024 Paris, France
Senior Thesis on Non-Abelian Gauge Theories <i>Bilkent University</i> Research Advisor: Prof. Dr. Ali Ulvi Yilmazer As the second part of my senior thesis, I worked on theoretical explanation of Non-Abelian Gauge Theories describing fundamental interactions. I mainly benefited from Peskin's book.	February – June 2023 Ankara, Turkey
Senior Thesis on Spontaneous Symmetry Breaking and Higgs Mechanism <i>Bilkent University</i> Research Advisor: Prof. Dr. Ali Ulvi Yilmazer I worked on theoretical explanation of Spontaneous Symmetry Breaking and Higgs Mechanism in QM framework. I mainly benefited from Griffiths, and Halzen and Martin's books.	Aug '22 – Feb '23 Ankara, Turkey
Internship on Physics-Informed Neural Networks <i>Roketsan</i> Research Advisor: Dr. Umut Demirezen I worked on numerical solutions of the Nonlinear Schrödinger equation and Burgers' equation using Physics-Informed Neural Networks (PINN) with the PyTorch library.	June – July 2021 Ankara, Turkey
Computer Engineering Senior Project on Neural Pollen Classification <i>Bilkent University</i> Research Advisor: Dr. A. Ercüment Çiçek I was the project leader of a group who worked on pollen detection and classification under a light microscope with Convolutional Neural Networks. We prepared the dataset from scratch with the help of R.A. Aydan Acar, Ankara University. The project got the Data Science Award of CS Fair '22 from Yapı Kredi Technologies.	Sep 2021 – June 2022 Ankara, Turkey

RELEVANT COURSES

Master's in Physics | M2 ICFP Physics

Quantum Field Theory I and II, Conformal Field Theory, Phenomenology of the Standard Model and Beyond, Lie Groups Lie Algebras and Representations, Advanced Statistical Physics and New Applications, General Relativity, Quantum Information, Machine Learning

Master's in Physics | M1 ICFP Physics

Relativistic Quantum Mechanics and Introduction to QFT, Introduction to General Relativity, Symmetries in Physics, Quantum Optics, Cosmology, Climate Physics, Library-based Project ($SU(5)$ Grand Unification)

Bachelor of Science | Physics

Nuclear and Particle Physics, Quantum Measurements and Sensing (Grad Level Course), Quantum Optics (Grad Level Course), Introduction to Quantum Computation (Grad Level Course), Condensed Matter Physics I

Bachelor of Science | Computer Engineering

Machine Learning, Artificial Intelligence, Signals and Systems, Number Theory, Automata Theory and Formal Languages

PROJECTS

Library-based Project on $SU(5)$ Grand Unification | ENS - PSL

September 2023 – February 2024

Research Advisor: Prof. Dr. Raffaele Tito D'Agnolo

Paris, France

I worked on the Georgi-Glashow Model of $SU(5)$ and how that Lie group can spontaneously be broken into the Standard Model $SU(3) \otimes SU(2) \otimes U(1)$ product group. I have derived $\mathfrak{su}(3)$ Lie algebra representations and showed how $SU(5)$ representations can be decomposed via Young tableau to cover the Standard Model.

Monte Carlo Simulation on Gauge Theories | Bilkent University

September 2022 – January 2023

Research Advisor: Prof. Dr. Yiğit Gündüç

Ankara, Turkey

I worked on Z_2 Lattice Gauge Theory where strong interactions are simulated with a non-perturbative approach using Monte Carlo Simulations.

Neural Style Transfer of Paintings to Selfies | Bilkent University

September 2021 – January 2022

I was the project leader of a group who worked on Neural Style Transfer of selfies to paintings with Convolutional Neural Networks (mainly VGG-19) with the PyTorch library.

FELLOWSHIPS

PSL Fellowship | École normale supérieure - PSL

September 2023 – present

Merit based scholarship for master's studies in physics

Cité Internationale Merit Scholarship | Cité Internationale Universitaire de Paris

September 2024 – present

Merit based scholarship covering accommodation for the second year of master's studies

French Embassy - TEV Scholarship | French Embassy in Turkey

September 2023 – June 2024

Merit based scholarship for the first year of master's studies

Bilkent Scholarship | Bilkent University

September 2018 – June 2023

Merit based comprehensive 100% scholarship also covering accommodation and a stipend

TÜBİTAK National Undergraduate Scholarship | Tübitak

September 2019 – June 2023

Merit based scholarship from Scientific and Technological Research Council of Türkiye

OUTSIDE CURRICULUM ACTIVITIES

Social Projects

I have taken an active part in several social projects aimed at introducing engineering and sciences to high-school students in less privileged areas, such as Mobile Days '17, CS Fair '17, Üniversiteye Doğru '19, VOL-E.

Aikido

4th Kyu Aikido practitioner.

Hiking and Camping

I enjoy regularly hitchhiking along the western side of Turkey for wild camping and hiking.