

Anthony Jalkh

Master's Student in Fundamental Physics at Université Paris-Saclay

Contact

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Skills and Knowledge

Programming Languages :

- Python (NumPy, SciPy, Matplotlib, Pandas, Scikit-Learn, TensorFlow, PyTorch, etc)
- Machine Learning with Python
- Java
- C++
- MATLAB
- Maple

Scientific Tools :

- GitLab / GitHub and Overleaf Integration
- PHITS (Monte Carlo Simulations, FORTRAN-based)
- LaTeX
- Typst (LaTeX alternative)
- Local LLM Optimization (LM Studio / Ollama)

Operating Systems and Softwares :

- Experience with Windows, MacOS, and Linux (Mint, Ubuntu, Kali)
- Fiji / ImageJ, Paraview
- Stellarium, Celestia
- Microsoft Office, Libre Office, Canva
- VSCode, JetBrains (PyCharm), Google Colab, Jupyter Lab
- Vi/Vim and NeoVim (LSP configuration)
- Experience with the use of virtual machines and SSH protocol basics

Ongoing Learning

- Formal proof verification with Lean (logic & foundations)
- Numerical experimentation related to relativistic models

Interests

Cosmology, Mathematics, Particle Physics, Astrophysics, Quantum and Statistical Mechanics, Programming, Open Source Contributions, Machine Learning, Retro-Computing & Console Homebrew using Open Source Software, Philosophy

I especially enjoy the intersection between cosmology, mathematics, and philosophy or, as Eugene Wigner would call it, "The Unreasonable Effectiveness of Mathematics in the Natural World"

Languages

- English (Fluent, Scientific Redaction and Communication)
- French (Fluent, Scientific Redaction and Communication + 98/100 on the DELF B2)
- Arabic (Native)

Education

Master's Degree in Fundamental Physics

Université Paris-Saclay, Orsay, France

2025 - Current

Bachelor of Science in Physics

Université Saint Joseph de Beyrouth, Beirut, Lebanon

2023 - 2025

- Completed the equivalent of nearly 3 years of courses in 2 years
- Received the Valedictorian Prize for being valedictorian in every semester
- Dean's List of Honor every semester with a final grade of 92.13/100

Bachelor of Engineering in Computer Engineering

Lebanese American University, Beirut, Lebanon

2022 - 2023

High School Diploma (General Sciences - Maths, Physics)

Collège des Saints Cœurs Ain Najm, Ain Najm, Lebanon

2019 - 2022

- Valedictorian with a grade of 17.88/20 on the official General Sciences Lebanese Baccalaureate

Projects and Experience

Research Internship

CNRS-L (Lebanese Atomic Energy Commission), Beirut, Lebanon

2025

- Conducted Monte Carlo radiation shielding simulations using the FORTRAN-based PHITS radiation transport simulation software
- Designed multiple, continuously evolving, shielding designs aiming for optimal protection against ionizing radiation from both an AmBe source and a D-D neutron generator situated in Lebanon's leading research facility
- Shielding parameters and design specifically tailored towards preparing the facility for future advanced neutron spectrometry experiments, including the planned integration of Bonner Sphere detection systems.

Hubble Constant Estimating App

2025

Personal Project

- Built an interactive Python application to infer the Hubble constant using observational data from the HOLiCOW collaboration, implementing the cosmological time-delay distance ($D\Delta t$) formalism for lensed quasar systems.
- Modeled how lensing geometry, redshift, and light-travel time contribute to constraints on H_0 , with visual tools to explore parameter sensitivity and cosmological interpretation
- Compared a linear regression model to a neural network under identical conditions to demonstrate the non-linear nature of gravitational lensing predictions; the neural network achieved $MSE \approx 0.1$ vs. ≈ 26 for the linear model.
- Integrated real-time visualizations, uncertainty controls, and a built-in LLaMA-3 (Groq) assistant capable of answering any questions a user may have about the project by explaining both the physics and the methodology

Nuclear Shell Model Solver

Ongoing (2026)

Personal Project

- Developing a Python implementation of the radial Schrödinger equation using a Woods-Saxon potential with spin-orbit coupling
- Computing single-particle nuclear energy levels and reproducing magic numbers through energy-gap analysis
- Applying finite-difference discretization and eigenvalue solvers (NumPy/SciPy)
- Visualizing nlj orbitals and shell structure with Matplotlib

Numerical Exploration of Relativistic Spacetime Models

Ongoing (2026)

Personal Project

- Exploring discrete numerical representations of spacetime metrics inspired by general relativity
- Investigating simplified geodesic evolution and curvature effects under strong computational constraints
- Targeting deployment on constrained ARM-based hardware (Nintendo DSi) using homebrew tools
- Emphasis on performance-aware implementation rather than full numerical general relativity
- Studying how physical models must be adapted when computational resources are severely limited

Documented Visits in Medical Physics

2024

Medical Physics Course at Université Saint-Joseph de Beyrouth

- Conducted in-depth physical analysis of radioprotection, radiotherapy and radiology operations, describing clinical procedures and workflow coordination across different hospital sections
- Authored three detailed reports synthesizing the quantum and nuclear physics principles governing high-tech medical machinery (e.g., MRI, linear accelerators) and explaining the rationale behind operational standards

Scientific Outreach and Creation of Scientific Posters

2024

Science Communication Course at Université Saint-Joseph de Beyrouth

- Received dedicated training in public speaking from Lebanon's leading experts
- Created and presented scientific posters in front of an audience and a jury consisting of both the Physics and Chemistry head of departments
- Acquired essential skills in researching complex topics, tailoring them towards their audience, and presenting them in a clear, concise manner.

Citizen Science in Astronomy

2023

Personal Project

- Contributed to multiple active citizen science research on the Zooniverse platform with a focus on astronomy and cosmology oriented projects