Anthony Jalkh

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

Contact

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Skills & 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, Homebrewing Retro Consoles 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 **2025 - Current**

Université Paris-Saclay, Orsay, France

Bachelor of Science in Physics **2023 - 2025**

Université Saint Joseph de Beyrouth, Beirut, Lebanon

- 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 **2022 - 2023**

Lebanese American University, Beirut, Lebanon

- Dean's List of Honor in each of the two semesters

High School Diploma (General Sciences - Maths, Physics) **2019 - 2022**

Collège des Saints Cœurs Ain Najm, Ain Najm, Lebanon

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

Projects and Experience

Research Internship **2025**

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

- 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 H0LiCOW 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_o, 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 ≈ 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 Vulgarization 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