Marçal Herraiz Bayó

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I am a Physics and Mathematics student at the University of Barcelona, currently in my fifth —and last— year of study. My interests encompass a wide range, from quantum and fluid mechanics to differential geometry and dynamical systems. I am specially intrigued by the geometric description of modern physical theories and phenomena.

Education

(Expected) June 2025 – Sep 2020

University of Barcelona
Bachelor of Science in Physics — Grade: 8.51/10
Bachelor of Science in Mathematics — Grade: 9.0/10
- I am enrolled in the dual degree programme in Physics and Mathematics, which admits 20 students annually and allows them to pursue both bachelor's degrees concurrently.
- Physics thesis title: How Classical Shadows Improve Quantum Learning.
- Mathematics thesis title: Yang-Mills Equations and Gauge Theories.

June 2020 – Sep 2018

Mireia Centre of Studies
Technological Baccalaureate
- GPA: 10/10. 1st-ranked student of the class.

Experience

(Expected) June 2025 – Sep 2024

Barcelona Supercomputing Centre – BSC
Visiting Student
- Pursuing my Physics bachelor's thesis on quantum computing, focusing on classical shadows.
- Working in the Quantic group.
- Supervisors: Prof. Bruno Julià, Sergi Masot, Berta Casas.

Sep 2024 – July 2024

Institute for Research in Biomedicine – IRB
Research Intern
- Studied DNA flexibility under DNA damage using a Coarse-Grained model.
- Optimised the current model to account for DNA sequential mismatches.
- Devised and implemented new methods to calculate DNA geometric properties.
- Worked in the Molecular Modelling and Bioinformatics group.
- Supervisors: Prof. Modesto Orozco, David Farré Gil.

Aug 2023 – June 2023

Centre for Mathematical Research – CRM
Research Intern
- Worked on a research project centred around transcendental dynamics within the complex exponential family.
- Focused on the results obtained by Robert L. Devaney and Michal Krych for a specific parameter value of this family, giving a complete description of the dynamics in this set.
- Supervisors: Prof. Núria Fagella, Prof. Xavier Jarque.

Grants and Honours

Sep 2024 – July 2024

Maths4Life Awardee — 1,200 €
- Awarded one of the five grants offered by IRB Barcelona's Maths4Life Programme to conduct research at the intersection of mathematics and biomedicine.

Present
Sep 2021

Excellent Performance 1,500 €
- Recipient of the University of Barcelona's honour for exceptional academic performance during university studies.

Sep 2021
Sep 2020

Baccalaureate with Honours 1,700 €
- Issued by Generalitat de Catalunya to those students with an excellent academic record during baccalaureate.

Oct 2019
Jan 2019

Mad for Science Programme
- Catalunya La Pedrera Foundation has developed the Mad for Science Programme to open the doors of the leading research institutes to exceptional High School students. I participated in the physics course.

Additional Courses

July 2023
Apr 2023

Python for Data Science and Machine Learning – Udemy
- Implemented various machine learning algorithms, including k-means clustering, linear and logistic regression, random forest and decision trees, SVMs, and neural networks.
- Certificate of completion

Jan 2023

Machine Learning with Python – Coursera
- Learnt the fundamentals of machine learning and studied different algorithms, such as linear and logistic regression, SVM, KNN, and decision trees.
- Certificate of completion

Dec 2022
June 2022

100 Days of Code: The Complete Phyton Pro Bootcamp – Udemy
- Developed proficiency in Python programming language through building 100 unique projects over 100 days, including automation scripts, web and app development, data science and machine learning models.
- Certificate of completion

Invited Talks

Sep 2024

Extraordinary BioMed Seminar - Maths4Life 2024
In this seminar organised by IRB, I presented my research work undertaken as a summer intern.

Aug 2023

Barcelona Introduction to Mathematical Research – BIMR 2024
Presented the results I obtained during the summer internship at CRM to an expert audience.

Languages

Spanish Native Speaker
Catalan Native Speaker
English Advanced Level C1

Coding Skills

Languages: Python, C, Mathematica, LaTeX, Bash, SageMath.
Libraries: Pandas, SciPy, NumPy, Scikit-learn, Seaborn, etc.
Other: Experience with Unix/Linux and computational modelling.

Volunteering and Activities

- **Science Fellows**: initiative of the Catalunya la Pedrera Foundation to develop science communication activities such as expositions in museums and talks in high schools.
- **Problem Solving**: via books and online resources, solving problems is an activity that I perform, enjoy, and continue to learn on a daily basis.