



EFRÉN RODRÍGUEZ RODRÍGUEZ

ELECTRONIC PHYSICIST

PERSONAL PROFILE

Professional with a background in Nuclear and Particle Physics, with over five years of experience in the design, construction, and implementation of advanced technology in the field of instrumentation and sensors. I have led and participated in international high-tech projects such as the LHCb silicon pixel detector and the Timepix4 Beam Telescope. With a strong foundation in electronics, data analysis, project management, and complex problem-solving, I seek to apply my knowledge in developing innovative solutions within the private sector.

WORK EXPERIENCE

Postdoctoral Researcher

CERN | Oct. 2024 - Present

I lead a team responsible for three key projects in the development of advanced technology for particle detection:

- 3D Column Silicon Sensor Simulation: I oversee the simulation and optimization of sensors to improve precision in high-energy experiments.
- Development of a Timepix4 Telescope: I direct the construction and operation of a telescope based on Timepix4, managing both the technical team and data analysis during test beam campaigns.
- Development of Testing Techniques: I coordinate the creation of setups and innovative techniques to validate new high-energy physics sensors.

Research Technician

IGFAE - USC | Sept. 2019 - Sept. 2024

At IGFAE, I participated in the calibration and characterization of high-speed data transmission lines for the upgrade of the VELO detector in the LHCb experiment, developing hardware and software algorithms to improve signal integrity. I also designed a micrometric measurement system and developed an FPGA-based test setup to assess cable quality, ensuring reliable data transmission. As a Visiting Researcher at CERN, I optimized control tools and calibration algorithms, significantly reducing calibration time and improving operational efficiency. Additionally, at Nikhef, I led test beam campaigns for the development of the Timepix4 telescope, refining advanced data analysis techniques.

CONTACT



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PROGRAMMING

- Python
- WinCC
- VHDL
- C ++
- LabVIEW
- Fortran

LANGUAGES

- English
(Intermediate, B2)
- German
(Beginner, A1.1)
- Galician
(Native, Celga4)
- Spanish
(Native)

EXPERIENCIA LABORAL

Invited Researcher

Nikhef | Jun. 2022 - May 2023

I contributed significantly to the design, construction, and control of the Timepix4 Particle Beam Telescope, optimizing the capture of particle tracks with high spatial and temporal precision. I led several test campaigns at accelerators, managing everything from installation to advanced data collection. I developed a control system in Python for data acquisition through Spidr4 boards, and through software analysis developed in C++, I improved the temporal resolution to 90 picoseconds and the spatial resolution to 2 microns. These improvements advanced the research of silicon pixel sensors and high-performance ASICs, opening new technological opportunities.

Invited Researcher

CERN | Aug. 2021 - Dec. 2021

During my stay at CERN as a Visiting Researcher, I contributed to the commissioning of the LHCb VELO silicon pixel detector by developing installation tools, control algorithms, and a fast equalization process to improve operational efficiency. Additionally, I participated in test campaigns for 3D sensors at the SPS, performing I-V curve measurements and integrating data acquisition systems. I also designed an interface board to manage particle beam signals and a refrigerated climate chamber to optimize the performance of irradiated sensors.

Company Internship

IGFAE - USC | Jun. 2018 - Jun. 2019

I designed and implemented an automatic X-ray irradiation system for aging studies of electronic systems, with precise 3D beam mapping using high-precision motors ($\sim 100\text{ }\mu\text{m}$) for exact dosimetry. I programmed the control in LabVIEW for spiral movements and mapping using a diode. Additionally, I developed an algorithm in Python to optimize the position and rotation of the objects, ensuring uniform irradiation profiles, which are essential for aging studies of ASICs and VELO sensors under ionizing radiation.

EDUCATION

PhD in Nuclear and Particle Physics

University of Santiago de Compostela | Sept. 2020 - Present

Master's in Physics

University of Santiago de Compostela | Sept. 2019 - Sept. 2020

- Espetial mention in Nuclear and Particle Physics

Bachelor's in Physics

University of Santiago de Compostela | 2019

SKILLS

- Planning
- Fast learner
- Experimental design
- Project management
- LaTeX and programming

OTHER KNOWLEDGE

- Latex
- Office software
- Linux
- Soldering

HOBBIES

- Programming
- Artificial intelligence
- Electronics
- Photography
- Hiking
- Volleyball

COURSES AND SEMINARS

INF-303: Python IT Specialist certification Nov. 2023

Pearson

Applied Machine Learning Using Python Jun. 2022

Smart Mind

4th HEP C++ Course and Hands-on Training Apr. 2022

Software Institute for Data Intensive Sciences

The 39th RD50 Workshop - Radiation hard semiconductor devices for very high luminosity collider (Geneva, Switzerland) Nov. 2021

CERN

LHCb Starterkit 2021 workshop (Geneva, Switzerland) Nov. 2021

CERN

Data Science: Workflow and Programming Principles (Santiago de Compostela, Spain) Nov. 2021

University of Santiago de Compostela

Introduction to thermography, use and management of Flir A400 (Santiago de Compostela, Spain) Apr. 2021

Álava Ingenieros

Course online on semiconductor radiation detectors (Barcelona, España)

Apr. 2021

Barcelona Techno Week - University of Barcelona

GitHub CI+CD Introductory Course and Hands-on Training Feb. 2021

HEP Software Foundation and IRIS-HEP

Introduction to Data Science: Workflow and Programming Principles (Santiago de Compostela, Spain) Nov. 2020

Escola de Doutoramento Internacional da USC (EDIUS)

Quantum Computation and High Performance Computing 2019 Workshop

CiTiUs - University of Santiago de Compostela

VHDL language and design flow (Leuven, Bélgica) Sep. 2019

IMEC academy

ADGG020PO - EXCEL AVANZADO (España)

LIDERA KNOWLEDGE SL