Efren Rodriguez Rodriguez

Technical Project Manager | R&D Leader

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PROFESSIONAL SUMMARY

Technical project manager and R&D leader with 8+ years of experience delivering complex hardware-software systems across 3 countries (Spain, Netherlands, Switzerland). Currently leading a 20+ person cross-functional team at CERN, managing EUR 3M+ in project budgets. Proven track record in sensor development, system integration, and test campaign management. Achieved world-record 90 ps timing precision for particle tracking (4× improvement, 40% beyond target). Bridges the gap between hardware engineering and software-driven data analysis, combining hands-on technical expertise with strategic programme leadership.

CORE COMPETENCIES

Leadership: Project Management, Cross-Functional Team Leadership (20+), Stakeholder Management, Risk & Budget Management (EUR 3M+), Strategic Planning, Vendor Relations

Technical: Python, C++, ROOT, FPGA/VHDL, LabVIEW, Git, WinCC OA, Data Analysis, Signal Processing, System Integration

Domain: Sensor Development, Quality Assurance & Validation, Test Campaign Management, System Integration, Hardware-Software Interface, Precision Instrumentation

PROFESSIONAL EXPERIENCE

R&D Project Lead

Oct 2024 - Present

CERN, Geneva, Switzerland

- Lead 3 parallel R&D projects and coordinate a 20+ person cross-functional team across CERN and partner laboratories in 4 countries
- Manage EUR 200K+ in procurement and equipment budgets, negotiating with vendors and tracking deliverables against programme milestones
- Drive simulation and optimization of next-generation 3D silicon sensors, defining requirements and aligning outputs with the broader detector upgrade programme
- Reduced test-beam campaign turnaround by 30% through streamlined logistics planning and automated data analysis pipelines

Invited Researcher Jun 2022 - Jun 2023

Nikhef, Amsterdam, Netherlands

- Owned the full characterization pipeline for Timepix4 readout ASICs: defined 15+ test protocols, executed 500+ measurements, and reported results to international stakeholders
- Led design and construction of a Timepix4-based beam telescope, coordinating hardware integration across Nikhef and CERN teams
- Achieved world-record 90 ps timing precision with 2 µm spatial resolution for particle tracking — a 4× improvement over the previous system, exceeding the project target by 40%

Invited Researcher Aug 2021 - Feb 2022

CERN, Geneva, Switzerland

- Contributed to commissioning of the upgraded LHCb VELO detector (EUR 20M+ project), validating 10+ prototype modules against performance specifications
- Conducted R&D on next-generation 3D silicon pixel sensors through international test-beam campaigns at CERN and DESY

R&D Engineer & Project Coordinator Jan 2019 - Sep 2024

IGFAE, Santiago de Compostela, Spain

- Designed and validated 5 Gbps high-speed data transmission systems for the LHCb VELO upgrade, balancing signal integrity against strict space and radiation constraints
- Coordinated 6+ on-site visits and 4 test-beam campaigns at CERN, managing cross-border logistics between Spanish and Swiss teams
- Launched the Timepix4 ASIC characterization programme at IGFAE, establishing test infrastructure and measurement protocols adopted by 2 partner laboratories

Junior Research Engineer Jun 2018 - Sep 2020

IGFAE, Santiago de Compostela, Spain

- Built and characterised a 3D X-ray mapping prototype in collaboration with CERN, producing calibration datasets used by 3 downstream research projects

CERTIFICATIONS

Python IT Specialist (INF-303) - Certiport / Pearson VUE, 2023

CERN Radiation & Safety Certifications - CERN, 2021-2024

EDUCATION

Ph.D. in Particle Physics

University of Santiago de Compostela — 2020 - 2024

M.S. in Physics

University of Santiago de Compostela — 2019 - 2020

B.S. in Physics

University of Santiago de Compostela — 2015 - 2019

LANGUAGES

Spanish (Native)|English (C1 - Full Professional)|Galician (Native)

SELECTED PUBLICATIONS

- **Silicon vertex detector with timing for the Upgrade II of LHCb.** *Nucl. Instrum. Methods Phys. Res. A,* 2023.
- **Tracking the Time: 3D pixel time resolution and Landau contribution evaluation.** *Nucl. Instrum. Methods Phys. Res. A,* 2023.
- **The LHCb upgrade I.** *LHCb Collaboration, arXiv:2305.10515,* 2023.

CONFERENCE PRESENTATIONS

- **The LHCb VELO detector: design, operation and first results.** *13th Hiroshima Symposium (HSTD13),* Vancouver, 2023.
- **New Results from Timepix4 at the SPS.** *18th Trento Workshop on Advanced Silicon Radiation Detectors,* Trento, 2023.
- **A Silicon Vertex Detector with Timing for the Upgrade II of LHCb.** *15th Pisa Meeting on Advanced Detectors,* Elba, 2022.