Ricardo Peres

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Education/Experience

2025–present — **MSCA Research Fellow**, *Imperial College London*.
Project: *Improving the optical readout instrumentation and supernova-readiness of XLZD, the next-generation dark matter experiment (IRIS-XLZD).*
The IRIS-XLZD project explores the potential of using SiPMs in the LXe veto region of XLZD, from simulation and sensitivity to prototyping and full-scale testing of an end-to-end solution. In parallel it aims to establish the path to the multi-messenger programme of XLZD, studying its physics reach upon detection and the requirements for a 100% livetime SNWatch System.

2023–2025 — **PostDoc Researcher**, *University of Zürich*.
Working on direct dark matter search, supernova neutrino detection with liquid xenon detectors, photosensor and TPC R&D

2018–2023 — **PhD Student Researcher**, *University of Zürich*.
PhD dissertation: *Multi-messenger Astrophysics and Dark Matter Searches with XENONnT and the SiPM Top Array of Xenoscope*
During my research work as a PhD student in the Astroparticle Physics group of Professor Laura Baudis physics I had the opportunity to work on a world-leading international collaboration (XENON Dark Matter Project). The collaborative, high-paced, and competitive environment was a good addition to the self-oriented and learning aspects of a PhD program.

2016–2018 — **Master's Degree in Physics**, *University of Coimbra*.
Branch of Particle and Nuclear Physics

2013–2016 — **Bachelor's Degree in Physics**, *University of Coimbra*.

Technical skills – software

Advanced / Development level — **Scientific and development Python, Data visualization, Git**.
I developed and contributed to several processing, data management and analysis Python packages used by my current research group and collaboration. These include, but are not limitted to, applying vectorisation and optimization with **numpy**, just in time computation with **numba**, data management with **pandas**, process-based parallelism with **multiprocessing**, as well as testing and documentation.

User level — **Bash, SQL, MongoDB, Graphana, slurm, GIMP, C++, cmake**.

Technical skills – Hardware

Computing — DAQ systems, data handling and storage solutions
Gas systems — High-vacuum chambers, noble gas systems
Photosensors — SiPMs, PMTs, on-board amplification circuits
Generic — Basic machining, soldering

Internal Positions and Responsibilities

2024–2025 — Team Leader of the Multi-Messenger working group of XENONnT
2023–2024 — Responsible for the data acquisition and data processing of the Xenoscope project
2021-2024 — Responsible for the light readout of the Xenoscope project

Soft skills

Personal	Independent, responsible with tasks, interdisciplinary approach
Management	Ability to plan and adapt, keep structure in projects, funds management
Social	Communicative in team, comprehensive and structured speech, teamwork-driven

Talks and Posters

September 2025 — **Catching Ghost Particles: Neutrino Detection in Dark Matter Experiments**, *Astroparticle Frontiers seminar series (Astrocent)*, Warsaw (online), Poland.

Seminar on the neutrino particle, the history and methods of neutrino detection, and recent developments in neutrino detection in dark matter experiments.

August 2024 — **The 2.6m-high Xenoscope TPC: design, assembly, and first results**, *LIDINE 2024 - Plenary talk*, São Paulo, Brazil.

Plenary talk at LIDINE 2024 on the assembly and commissioning results of the 2.6m-high TPC of Xenoscope.

June 2024 — **Real-time detection of Supernova Neutrinos in XENONnT**, *Neutrino 2024 - Poster*, Milan, Italy.

Poster on the real-time detection of Supernova Neutrinos in XENONnT, presented in the renowned Neutrino conference.

September 2023 — **XENONnT: Status and First Science Results**, *IBER2023 - Plenary talk*, University of Coimbra, Portugal.

Plenary talk at IBER 2023, the XVII Iberian Joint Meeting on Atomic and Molecular Physics, on the latest progress and results of the XENONnT experiment.

August 2023 — **DARWIN: a Next-Generation Observatory for Dark Matter and Neutrino Physics**, *EPS-HEP 2023 - Parallel talk*, University of Hamburg, Germany.

The European Physical Society Conference on High Energy Physics (EPS-HEP) is one of the major international conferences in the field. This talk focused on the physics goals of DARWIN and the on-going R&D to achieve them.

September 2022 — **SiPM array of Xenoscope, a full-scale DARWIN vertical demonstrator**, *LIDINE 2022 - Plenary talk*, University of Warsaw Library, Poland.

Plenary talk at LIDINE 2022 about the Xenoscope facility and project, with a focus on its top array (design, SiPM characterization, readout development, and signal simulation).

September 2022 — **Never miss a light show**, *Public talk*, University of Zürich, Switzerland.

General talk on the topic of Supernova detection with massive particles as part of the Universitas 21 Three Minute Thesis (3MT) Competition at the University of Zürich. This presentation won the Audience Award of the competition.

June 2022 — **Neutrino Physics in DARWIN**, *Poster*, Seoul, Korea (online).

Poster on the neutrino physics reach of the DARWIN observatory (neutrinoless double beta decay of ^{136}Xe, solar neutrinos searches with electron scattering and coherent elastic neutrino-nucleus scattering.

May 2022 — **SiPM readout of Xenoscope**, *XeSat 2022 - Plenary talk*, University of Coimbra, Portugal.

Plenary talk at XeSAT 2022 about the top array of Xenoscope, from design and SiPM characterization to signal simulation.

November 2021 — **Xenoscope A full scale vertical demonstrator for DARWIN**, *Poster*, University of Zürich, Switzerland.

Outreach poster for the Department of Physics of the University of Zurich Open Day 2021.

September 2021 — **The XENONnT detector and physics programme**, *SPS2021 - Parallel talk*, University of Innsbruck, Austria.

Parallel talk in the 2021 annual swiss and austrian physical societies about the XENONnT detector and science program.

February 2021	**Recent results from XENON1T and multi-messenger future of XENONnT**, *NeuTEL 2021 - Parallel talk*, University of Padova (online), Italy.
	Parallel talk in the XIX International Workshop on Neutrino Telescopes conference about the recent XENON1T results, focused on neutrino-related analysis, and the ongoing efforts to connect XENONnT to SNEWS.
September 2020	**3D Electric Field Simulations for XENONnT**, *UZH-ETH PhD meeting - Seminar*, University of Zürich, Switzerland.
	30 min seminar on my work running full 3d electrostatic field simulations of the XENONnT detector. The seminar covered an introduction to the XENON detectors and direct DM search, the Boundary Element Method applied to electrostatic field simulations, the implemented geometry of the XENONnT TPC and current results on drift and extraction fields.
August 2019	**Integration of XENON into the SuperNova Early Warning System**, *SPS 2019 - Poster*, University of Zürich, Switzerland.
	Poster for the 2019 Joint Annual Meeting of the Swiss and Austrian Physical Societies poster session.
June 2019	**Integration of XENON into the SuperNova Early Warning System**, *SNEWS2.0 workshop - Poster*, Laurentian University, Sudbury, Canada.
	Poster for the SWEWS2.0 Workshop poster session.
July 2018	**Identificação de Partículas em Detetores Gasosos**, *Seminar*, University of Coimbra, Portugal.
	A broad overview talk about particle interaction, the fundamentals of particle detection and the evolution of gaseous particle detectors.
February 2018	**Neutrino-less Double Beta Decay - An Introductory Overview of Current Day Experiments**, *Seminar*, University of Coimbra, Portugal.
	Starting from the stability of the Standard Model and the Beta Decay spectrum solution of Pauli, the seminar will lead you into the unresolved mystery of Majorana concept of particle and the Majorana Neutrinos, their importance in rare events as Double Beta Decay without the emission of Dirac Neutrinos and various current day experiments and projects looking for this decay.
May 2017	**Dark Matter - Search for DM and XENON1T first results**, *Seminar*, University of Coimbra, Portugal.
	Talk on the subject of Dark Matter: why do we need DM in current day Physics; Double-phase TPC and their use in direct DM search; The XENON collaboration and the XENON1T experiment; Latest results and limits on WIMP-nucleon interactions search.

Schools and Workshops

15–17 Oct 2023	**Interdisciplinary Strategic Partnership Tokyo - Zurich**, *ETH Zurich*, Switzerland.
23-26 May 2022	**International Workshop on Applications of Noble Gas Xenon to Science and Technology (XeSAT 2022)**, *University of Coimbra*, Portugal.
	5th edition in a series of meetings focusing on all aspects of using xenon and other noble gas detectors in various radiation fields.
07-16 July 2021	**ISAAP 2020: Dark matter - from theory to detection**, *Vienna*, Austria.
	Postponed to 2021 due to the COVID19 pandemic, the international School n Astro-Particle Physics covered the topic of dark matter, from theory background, through curretn evidence, to detection.
	ISAAP 2021: Neutrino Physics, Astrophysics and Cosmology, *Valencia*, Spain.
	The 2021 edition of the International School on AstroParticle Physics focused on neutrinos, covering theory, cosmology, and detection.
18-26 February 2021	**XIX International Workshop on Neutrino Telescopes**, *Université Grenoble Alpes*, University of Padova (online).
	The 2021 edition of the Neutrino Telescopes conference, covering the topics of Large Detectors for Neutrino Astrophysics, Neutrino Physics and Cosmology.

6-9 October 2019	**School of Statistics for Astrophysics: Variability and Time Series Analysis**, *Université Grenoble Alpes*, France.
	School of statistics focused on time series (including variabilities and transient events).
14-17 June 2019	**SNEWS 2.0 Workshop: Supernova neutrinos on the Multi-Messenger Era**, *Laurentian Univesity*, Canada.
	Workshop on the multi-messenger future of the Supernova Early Warning System.
12-16 March 2018	**LIP Data Science 2018 - (Astro)Particle Physics and the Bridge to Industry**, *Particle Research Laboratory (LIP)*, Lisbon.
	School on Data Science, Probability, Statistics and Machine Learning, deeply related to Particle Physics big data challenges.
June-July 2015	**Summer Course on Condensed Matter Physics: Huge Magnetoresistivity**, *Department of Physics, University of Coimbra*, Supervisor: Professor José António Paixão.
	The course included the preparation of samples and a deep study of their magnetic properties with different condense matter techniques and apparatus.
July 2013	**Summer University – Physics**, *Department of Physics, University of Coimbra*. School on Brownian motion of particles.
July 2012	**Summer University – Physics**, *Department of Physics, University of Coimbra*. School on superconductivity.
July 2011	**Summer University – Mathematics**, *Department of Mathematics, University of Coimbra*. School on the basics of probability and statistics.

Teaching

2025-current	**Lecturing**, *Imperial College London*, Lectures to postgraduate students on: *The High Energy Universe*; *Indirect Detection of Dar Matter*.
2025-current	**Laboratory demonstrator (TA)**, *Imperial COllege London*, Microprocessors (year 3 physics lab).
2024-2024	**Teaching assistant**, *University of Zurich*, Scientific Computing - PHY124.
2018-2024	**Exam supervision**, *University of Zurich*, Physics exams supervision..
2018-2023	**Teaching assistant**, *Univerisity of Zurich*, Laboratory classes (preparation, lecturing, correct reports, comunicating with students) - PHY 102/112/122/1030.

Student supervision

October 2023 - Octover 2024	**BSc Thesis Co-Supervisor**, *Univerisity of Zurich*, Supervision of thesis project "Design and characterisation of high-granularity SiPM readout boards for Xenoscope", of T. Maher.
January-August 2023	**MSc Thesis Co-Supervisor**, *Univerisity of Zurich*, Supervision of thesis project "Position Reconstruction with a SiPM Array in the DARWIN Demonstrator", of S. Ouahada.
May-December 2022	**BSc Thesis Supervisor**, *University of Zurich*, Supervision of thesis project "Characterisation of Silicon Photomultipliers for Xenoscope", of J. Haas.

Outreach

November 2025	**Science demonstration in School**, *Jersey*, As aprt of a *Native Scientists* workshop, led an interactive science (astronomy) demonstration at a school with 40+ participants..

September 2025	**Science Fair**, *London*, Pariticpant as a stand member on the *New Scientist Live* science fair, reaching 20k+ attendees over 3 days..
November 2024	**Outreach event organisation**, *Zurich*, Organized the event "Physics on Tap" with more than 40 attendants at a local bar..
2019–current	**Local laboratory tours**, *University of Zurich*.
September 2021	**Public laboratory tours**, *University of Zurich*, Scientifica 2021.
September 2019	**Public laboratory tours**, *University of Zurich*, Scientifica 2019.
2014–2018	**Science communication tours**, *University of Coimbra*, Sala Experimenta.

Extra-curricular

2018-2024	**Amateur Violinist**, *Universitätsorchester Polyphonia Zürich*, Amateur Student Orchestra, Zürich.
2020–2021	**Treasurer**, *Universitätsorchester Polyphonia Zürich*, Student orchestra association, Zürich.
2016–2021	**Member of the organizing committee**, *Orquestra Académica da Universidade de Coimbra*, University's orchestra, Coimbra.
2015–2018	**President of the Board**, *Tuna Académica da Universidade de Coimbra*, Cultural Student Association, Coimbra.
2014-2015	**Treasurer**, *Tuna Académica da Universidade de Coimbra*, Cultural Student Association, Coimbra.
2013-2018	**Amateur Violinist**, *Tuna Académica da Universidade de Coimbra*, Amateur Student Orchestra, Coimbra.

Languages

- Portuguese (Native)
- English (C1)
- German (A2)