

Ricardo Peres

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Education

2018–present **PhD Student Researcher**, *University of Zürich*.

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.

It provided the opportunity to become highly trained in **data analysis**, **data visualization** and **software development** with Python in a **big data environment**, to have strong **statistics** bases, to have effective and audience-oriented **communication skills** of technical and scientific subjects, and to be **teamwork-focused**

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 limited 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

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

References

- 1 **Prof. Dr. Laura Baudis**, laura.baudis@uzh.ch.
- 2 **Dr. Michelle Galloway**, michelle.galloway@physik.uzh.ch.
- 3 **Dr. Jose Cuenca García**, jose.cuenca@physik.uzh.ch.
- 4 **Dr. Diego Ramírez García**, diego.ramirez@physik.uzh.ch.

Conferences, Schools and Workshops

- 21-23 September 2022 **LIDINE 2022: Light Detection In Noble Elements**, *Astrocent/Nicolaus Copernicus Astronomical Center of the Polish Academy of Sciences, Warsaw, Poland*.
LIDINE is a conference series focused on noble gas/liquid detectors and related technologies, such as light and charge response in noble liquids, light and charge readout, signal reconstruction or applications.
- 30 May - 6 June 2022 **The XXX International Conference on Neutrino Physics and Astrophysics (Neutrino 2022)**, *Seoul, Korea (online)*.
The 50th anniversary edition of the acclaimed Neutrino conference.
- 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.
- 30 August-3 September 2021 **2021 Joint Annual Meeting of the Swiss and Austrian Physical Societies**, *University of Innsbruck, Austria*.
- 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).
- 26-30 August 2021 **2019 Joint Annual Meeting of the Swiss and Austrian Physical Societies**, *University of Zürich, Switzerland*.
- 14-17 June 2019 **SNEWS 2.0 Workshop: Supernova neutrinos on the Multi-Messenger Era**, *Laurentian University, 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 condensed 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.

Talks, Seminars and Poster Sessions

- September 2022 **SiPM array of Xenoscope, a full-scale DARWIN vertical demonstrator**, *University of Warsaw Library, Poland*, Plenary talk.
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**, *University of Zürich*, Switzerland, Public talk.
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**, *Seoul*, Korea (online), Online poster.
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**, *University of Coimbra*, Portugal, Plenary talk.
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**, *University of Zürich*, Switzerland, Poster.
Outreach poster for the Department of Physics of the University of Zurich Open Day 2021.
- September 2021 **The XENONnT detector and physics programme**, *University of Innsbruck*, Austria, Parallel talk.
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**, *University of Padova* (online), Parallel talk.
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**, *Internal Seminar*, University of Zürich.
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**, *University of Zürich*, Poster, 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**, *Laurentian University*, Poster, Sudbury, Canada.
Poster for the SNEWS2.0 Workshop poster session.
- July 2018 **Identificação de Partículas em Detetores Gasosos**, *Department of Physics, University of Coimbra*, General Physics Seminar, 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**, *Department of Physics, University of Coimbra*, General Physics Seminar, Coimbra.
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**, *Department of Physics, University of Coimbra*, Talk on High Energy Physics, Coimbra.
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.

Teaching and supervision

- May-December 2022 **Thesis Supervisor**, *University of Zurich*, Supervision of thesis project "Characterisation of Silicon Photomultipliers for Xenoscope", of J. Haas.
- 2018-2022 **Teaching assistant**, *University of Zurich*, Labs alone. Prepare, do the class, correct reports, communicating with students, exam supervision..
- cventry2018-2022 Exam supervision *University of Zurich* Physics exams supervision.

Outreach

- 2019–2022 **Local laboratory tours**, *University of Zurich*, Explaining DM and liquid Xenon stuff for the general public, from highschool students to visiting professors..
- September 2021 **Public laboratory tours**, *University of Zurich*, Scientifica 2021.
- September 2019 **Public laboratory tours**, *University of Zurich*, Scientifica 2021.
- 2014–2018 **Science communication tours**, *University of Coimbra*, Sala Experimenta no DF..

Extra-curricular

- 2018-present **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 **Mother tongue**
- English **C1**
- German **A2**