



Date	13/07/2022
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Part A. PERSONAL INFORMATION

Name & Family Name	PATRICIA SANCHEZ LUCAS		
Researcher Identifiers	Researcher ID	AAA-4509-2021	
	Orcid	0000-0002-4814-0788	
	Scopus-ID	55916072900	

A.1. Current Position

Institution	University of Granada		
Center	Department of Theoretical Physics		
Address	Avenida Fuente Nueva S/N		
Teléfono	+34 948 242 759	Correo electrónico	patriciasl@ugr.es
Position	Juan de la Cierva Researcher	Since	01.01.2022
Key Words	neutrinos, noble gas TPCs, photosensors		

A.2. Studies

Degrees	University	Date
Bachelor in Physics	University of Granada	01.07.2011
Master in Advanced Methods and Techniques in Physics	University of Granada	30.07.2012
PhD. in Physics and Space Sciences	University of Granada	20.01.2017

A.3. Scientific Metric

Metrics from Web of Science Researcher ID:

- Publications: 55 (39 in Q1 journals, 8 in D1)
- Citations: 4438
- 8 publ. with more than 100 citations
- 1 publication in Science
- Average citations/year: 493.1
- Average citations/publication: 83.7
- h index: 25

Others:

- International conferences: 8 talks, 2 posters
- Internal Notes: 9 (3 in the Pierre Auger collaboration, 6 in the DARWIN collaboration)
- Bachelor theses supervised: 2
- Master theses supervised: 2
- PhD these co-supervised: 1
- External referee for PhD theses: 1

Part B. SUMMARY OF THE CV

-- KNOWLEDGE AND SKILLS --

During my master in Advanced Methods and Techniques in Physics (**U. Granada, 2012**) I received a sound theoretical training focused on nuclear and particle physics. After that, I did a PhD in Physics (**U. Granada, 2013-2017**) based on analyzing data for the International Pierre Auger Experiment, where I acquired crucial skills about programming, simulations and statistics that were key for the fruitful results of my PhD thesis as well as for my latest publications. To further expand my knowledge, I took a postdoc position offered to me by a world-leading group on hardware and R&D (**U. Zurich, 2018-2021**), where I gained wide expertise on photosensors and TPCs of liquified noble gases. In addition, I had the opportunity to develop training skills by mentoring younger scientists, teaching and doing outreach.



Recently, I rejoined the **Astroparticle Physics Group of the University of Granada (01.01.2022) with a *Juan de la Cierva* tenure track position**. My research plan is to fully exploit the potential of the cryogenic lab of the group and establish a key line of research based on the development of instrumentation for TPCs.

-- MOST RELEVANT SCIENTIFIC RESULTS --

My PhD research, supervised by Prof. A. Bueno (U. Granada) and co-mentored by Prof. A.A. Watson (U. Leeds), co-founder of the Pierre Auger Collaboration, was focused on the composition of ultra-high-energy cosmic rays. **I developed a new analysis technique that demonstrated for the first time the potential of the surface detector to infer the composition of cosmic rays and constrain hadronic models** over a broad energy range (0.3-100 EeV). The analysis was published as a full author list paper of the collaboration (~400 authors) and currently counts 116 citations in Inspire. I also presented the analysis as an oral contribution in the most important international conference in the field, the ICRC2017. This technique opened a new research line that gave rise to subsequent analyses and new thesis projects.

At the end of 2017 I joined, **as a postdoc**, the newly established ERC-funded DARWIN group of the University of Zurich, led by Prof. L. Baudis and whose main goal was to develop R&D for DARWIN, the future European Observatory for dark matter and neutrino physics. This group built in three years a 2.6m length prototype of DARWIN. **I was involved in the design, construction and commissioning of this detector as well as in the writing of the corresponding TDR**. I was also **responsible of the first xenon dual phase TPC with SiPMs**, built and operated in Zurich. The successful performance of this detector allowed us to publish calibrations with low energy sources in early 2020 and a measurement of the mean electronic excitation energy of liquid xenon at the end of 2021.

In parallel to the R&D, I worked also on investigating different science channels of DARWIN. From February 2019 to November 2021, **I coordinated the simulation effort of the DARWIN collaboration** (166 members), and I was strongly involved on both the development and maintenance of the DARWIN simulation framework. With this tool I produced the background spectra that were used in the latest DARWIN publications about the sensitivity to the neutrinoless double beta decay of Xe-136, and the sensitivity to low-energy solar neutrinos. I was **one of the corresponding authors of the first study** since I did part of the analysis too, and I presented the results in two international conferences (CNNP 2020, WIN2021), one symposium (Kashiwa2021) and three invited talks. Thanks to these achievements, I enjoyed a high visibility within the DARWIN collaboration.

Part C. MOST RELEVANT CONTRIBUTIONS

C.1. Most relevant publications

Title: A measurement of the mean electronic excitation energy of liquid xenon.

Authors: Baudis, L., Sanchez-Lucas, P., Thieme, K.

Journal: Eur. Phys. J. C. 81, (2021) 1060. Published: December 2021.

Citations (Inspire): 6. DOI: [10.1140/epjc/s10052-021-09834-x](https://doi.org/10.1140/epjc/s10052-021-09834-x)

Title: Design and construction of Xenoscope: a full-scale vertical demonstrator for the DARWIN observatory.

Authors: Baudis, L. et al.

Journal: JINST 16 (2021) P08052. Published: August 2021.

Citations (Inspire): 3. DOI: [10.1088/1748-0221/16/08/P08052](https://doi.org/10.1088/1748-0221/16/08/P08052)

Title: *Solar neutrino detection sensitivity in DARWIN via electron scattering.*

Authors: Aalbers, J. et al., [DARWIN Collaboration]

Journal: Eur. Phys. J. C 80 (2020) 12, 1133. Published: December 2020.

Citations (Inspire): 30. DOI: [10.1140/epjc/s10052-020-08602-7](https://doi.org/10.1140/epjc/s10052-020-08602-7)

Title: *Sensitivity of the DARWIN observatory to the neutrinoless double beta decay of Xe136*

Authors: Agostini, F. et al., [DARWIN Collaboration] (**corresponding author**)



Journal: Eur. Phys. J. C 80 (2020) 9, 808. Published: September 2020.

Citations (Inspire): 42. DOI: [10.1140/epjc/s10052-020-8196-z](https://doi.org/10.1140/epjc/s10052-020-8196-z)

Title: *The first dual-phase xenon TPC equipped with silicon photomultipliers and characterisation with Ar37.*

Authors: Baudis, L. et al. (**corresponding author**)

Journal: Eur. Phys. J. C 80 (2020) 5, 477. Published: May 2020.

Citations (Inspire): 9. DOI: [10.1140/epjc/s10052-020-8031-6](https://doi.org/10.1140/epjc/s10052-020-8031-6)

Title: *Deep learning techniques applied to the physics of extensive air showers.*

Authors: Guillen, A. et al.

Journal: Astropart Phys. 111 (2019) 12-22. Published: September 2019.

Citations (Inspire): 9. DOI: [10.1016/j.astropartphys.2019.03.001](https://doi.org/10.1016/j.astropartphys.2019.03.001)

Title: *Inferences on mass composition and tests of hadronic interactions from 0.3 to 100 EeV using the water-Cherenkov detectors of the Pierre Auger Observatory.*

Authors: Aab, A. et al., [Pierre Auger Collaboration] (**Publication of my PhD thesis**)

Journal: Phys. Rev. D 96 (2017) 12, 122003. Published: December 2017.

Citations (Inspire): 116. DOI: [10.1103/PhysRevD.96.122003](https://doi.org/10.1103/PhysRevD.96.122003)

Title: *Contamination of Dark Matter Experiments from Atmospheric Magnetic Dipoles.*

Authors: Bueno, A. et al. (**Publication of my master thesis**)

Journal: Phys. Rev. D 88 (2013) 073010. Published: October 2013.

Citations (Inspire): 5. DOI: [10.1103/PhysRevD.88.073010](https://doi.org/10.1103/PhysRevD.88.073010)

Title: *Multi-messenger observations of a binary neutron star merger.*

Authors: Abbott, B. P. et al. [LIGO Collaboration et al.]

Journal: Astrophys. J. Lett. 848 (2017) 2, L12. Published: October 2017.

Citations (Inspire): 2471. DOI: [10.3847/2041-8213/AA91C9](https://doi.org/10.3847/2041-8213/AA91C9)

Title: *Observation of a large-scale anisotropy in the arrival directions of cosmic rays above 8×10^{18} eV.*

Authors: Aab, A. et al. [Pierre Auger Collaboration]

Journal: Science 357 (2017) 6537, 1266-1270. Published: September 2017.

Citations (Inspire): 304. DOI: [10.1126/science.aan4338](https://doi.org/10.1126/science.aan4338)

C.2. Participation in Projects

Project: CONTRIBUCIÓN DE LA UGR AL PROGRAMA CIENTÍFICO DEL EXPERIMENTO DE NEUTRINOS DUNE (PID2019-104676GB-C32)

Funding Agency: Ministerio de Ciencia e Innovación. Period: 2020-2022.

P.I.: Prof. Antonio Bueno (University of Granada). Funding: 310.970 euros

Type of participation: Juan de la Cierva Researcher (01/2022 - Present).

Task: Coordinator of the activities in the cryogenic lab. Coordinator of the effort toward the vertical-drift prototype of DUNE.

Project: XENOSCOPE: TOWARD A MULTI-TON XENON OBSERVATORY FOR ASTROPARTICLE PHYSICS (ERC grant agreement No. 742789)

Funding Agency: European Research Council (ERC). Period: 10/2017 - 09/2022.

P.I.: Prof. Laura Baudis (University of Zurich). Funding: 3.344.108 euros.

Type of participation: Researcher (from 12/2017 - 11/2021).

Project: PARTICIPACIÓN DE LA UNIVERSIDAD DE GRANADA EN EL EXPERIMENTO AUGER Y SU FUTURA MEJORA AUGERPRIME (FPA2015-70420-C2-2-R)

Funding Agency: Ministerio de Economía y Competitividad. Period: 2016-2017.

P.I.: Prof. Antonio Bueno (University of Granada). Funding: 169.400 euros.

Type of participation: Researcher (02/2017-11/2017), PhD student (from 01/2016-01/2017)



C.3. Stays abroad

- 3 months stay at the University of Wuppertal (Germany). 2014
- 2 weeks stay at the Pierre Auger Observatory in Malargüe (Argentina). 2013

C.4. Other merits

Research Contracts

- Juan de la Cierva Incorporación (01/2022). Ministerio de Ciencia e Innovación (Spain)

Grants

- FPU Grant for PhD studies (03/2013 - 02/2017). Ministerio de Educación (Spain)
- PhD Mobility Grant 2014 from the University of Granada for a 3-months stay at the University of Wuppertal (Germany).
- Collaboration Grant (10/2011 - 06/2012). Ministerio de Educación (Spain)
- Initiation to Research Grant (Call 2010). University of Granada

International Conferences and Invited Talks

- 11/2021: Kashiwa Dark Matter Symposium 2021 (online). **Talk**
- 06/2021: Conference WIN 2021 (online). **Poster**
- 03/2021: IFIC Seminar Series 2021 (online). **Invited talk**
- 02/2020: Conference CNP 2020, Cape Town (South Africa). **Talk**
- 09/2019: HighRR Workshop 2019, Heidelberg (Germany). **Invited talk**
- 06/2019: Conference XXXI Rencontres de Blois, Blois (France). **Talk**
- 06/2018: Neutrino Conference 2018, Heidelberg (Germany). **Poster**
- 07/2017: Conference ICRC 2017, Busan (Korea). **Talk**
- 07/2016: Conference PASCOS 2016, Quy Nhon (Vietnam). **Talk**

Meeting and Workshop Organization

- DARWIN 0vbb decay Workshop 2019, Zürich (Switzerland)
- DARWIN Collaboration Meeting 2018, Zürich (Switzerland)

Teaching

University of Zurich:

- Advanced Labs for Physics IV. Spring 2021
- Experimental Astroparticle Physics course, exercises (master degree). Spring 2020
- Physics Labs for medical students. Fall 2019, 2020
- Physics Labs for major (minors) in physics. Spring 2018, 2019 (Fall 2018)

University of Granada:

- Physics Labs for biologists. Spring 2015, 2016

Outreach

- Outreach videos about DARWIN-Xenoscope in YouTube: [DARWIN UZH 2020](#)
- Scientifica 2019. UZH-ETH outreach event (~20000 visitors)
- Lab Tours for high school students, University of Zurich (2018,2019)
- CERN International Masterclasses, Parque de las Ciencias Granada. (2013 – 2017, 2022)