

## Career Sheet: Researcher in Particle Physics



### Pedro Abreu, Researcher in Particle Physics and Professor

I studied physics at the Faculty of Sciences of the University of Lisboa from 1982 to 1986. In 1988, I joined the Instituto Superior Técnico (IST), the Engineering Faculty of the University of Lisboa, as a junior assistant and in 1991 as an assistant. In 1996, I concluded my PhD in 1996 and started a 5-year contract as an assistant professor that, in 2001, became a permanent position. In 2007, I passed the Aggregation Exams (similar to “habilitation” in some countries) and was promoted to Associate Professor in 2020. During my teaching career, I taught physics to engineering courses (namely Mechanics, Electromagnetism, Thermodynamics) and Particle Physics to advanced Physics students at Técnico Lisboa.

Research wise, I joined the DELPHI Experiment installed in the LEP Accelerator at CERN (previous to the present LHC), in 1987, working in searches and precision measurements until my PhD and in QCD matters afterwards, becoming co-responsible of the QCD Research Line of the Collaboration in 2001. In 2006, I also joined the Pierre Auger Observatory Collaboration and, more recently, the SWGO project.

In connection to Society, I was elected President of the South&Isles Delegation of the Portuguese Physics Society in 2010, and re-elected twice, until 2019. Among my most important contributions stands out the responsibility of the local organization of the 49th International Physics Olympiad, in Lisboa in 2018 (IPhO2018), and my participation in the local organization of the 17th European Science Olympiad, in Almada in 2019 (EUSO 2019), with the responsibility of the logistics of exams.

In 2003, I was appointed LIP Outreach Coordinator and Portuguese (PT) representative in IPPOG (International Particle Physics Outreach Group, then called EPOG – European Particle Physics Outreach Group) and in 2006 also PT representative in the newly created network “EPPCN” – European Particle Physics Communication Network (the last one only until the end of 2019).

Launched in 2005, the International Masterclasses in Particle Physics is an activity for secondary schools students that spend a day in the university analysing real data from CERN Experiments and that share their results with their peers in an international video-conference, and is since then, I have been the PT National Coordinator and responsible for these masterclasses in several places in the country, a very successful activity involving more than 1500 students every year.

With Gaspar Barreira - then President of LIP and PT Delegate to the CERN Council – launched in 2007 the CERN Portuguese Language Teachers Programmes, of which I am the Coordinator until today.

Finally, I was appointed Portuguese representative in the CERN based forum “Teachers and Students Forum” created in 2016 to boost the sharing of best practices concerning education and schools, for the subject of particle physics and related themes (physics, technologies, applications).

In addition to these activities, I speak at schools – by invitation – about 30 times a year (from primary schools to secondary schools at all levels).



## OVERVIEW OF THE JOB

### University Associate Professor in Physics, Research and Outreach in Particle/Astroparticle Physics, Co-Chair of IPPOG ([ippog.org](http://ippog.org))

As University Professor I am committed to Science and Teaching and training the next generation of scientists and engineers (because I am in an Engineering Faculty, that also features a Physics course). But besides Science, I am also strongly committed to doing Science Communication and Outreach, trying to engage the public and the students towards the benefits of the scientific method and the advantages of critical thinking (and the beauty of Physics and its applications). In Portugal, we have a strong network of physics and chemistry teachers in secondary and basic schools. This network was built over the years with the help of the CERN Teachers Programmes, especially the programme in Portuguese with the partial financial support of Ciência Viva Agency. Through this network, we were able to contact thousands of students in the last 15 years, and, along with many other partners, succeeded in increasing the interest of students for STEM careers, in particular at the Engineering Faculties. Although, required marks to enrol in a course at a Portuguese University cannot be compared fairly for all the courses: Técnico Lisboa has the two courses with the highest required marks to enrol in Portugal, one being Physics Engineering and Technology, the Physics course of Técnico Lisboa.

Therefore, I consider my job as intensively STEM-related, namely on STE side of the word.



## WHAT INSPIRED YOU

What inspired me to study and research Particle Science was the fact to [not] understand the Universe at the fundamental scale and the open questions about us, the world around us, this Universe and how it functions.



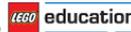
## TYPICAL WORKING DAY

In a class day: preparing classes, questions, quizzes, and lecturing them to all types of engineering students. In other days: prepare and run analyses on data from experiments (currently: Pierre Auger Observatory, SWGO); prepare activities for schools and go out to reach them and prepare the next generation of scientists (also through teachers and teacher training). Occasionally and very rarely, do very stressing/boring things like correcting exams and prepare applications and projects for funding.

#### COORDINATOR

#### PREMIUM PARTNERS

#### GENERAL PARTNERS





## STUDY & CAREER PATH

I graduated in Physics, had a temporary contract at the University, I had PhD in Particle Physics, obtained a permanent position after five years and passed my aggregation (“habilitation”) as a teacher after 11 years.

I have had the incredible luck of not wanting to change a single bit in my career path. Along with my career, I had the opportunity to follow post-graduation short courses. These so-called “schools” are training programmes such as the “CERN School of Computing” and the “CERN School of Physics” that have a very intensive duration of two weeks. It taught me the needed advanced physics that I needed for my studies, as many colleagues of mine. Nowadays, many Universities and Research Institutions also open their doors to receive students during the summer, for internships lasting from two weeks to three months, and these are a remarkable boost to the career of a young student.



## KEY SKILLS

The key-skills vary a lot along with the career. Early times, they were critical thinking, data analysis, problem-solving, collaboration. Later, the skills I needed were more related to coaching, leadership, presentation, and some marketing skills. All the other personal and social skills are very important at all times (adaptability, commitment, curiosity, creativity, emotional intelligence, empathy, flexibility, willingness to integrate), especially as the international collaborations became larger and larger.



## CAREER PROSPECT

With the skills acquired in the university and during my career, I could also possibly work and perform very well in Education, [Big] Data Analyses, Problem-solving, Teaching and Training, Executive Manager, Advisory, Consulting/Evaluator, Public and Schools Engagement.



## CHALLENGES

The main challenges I faced during my career were to get things working and get the best results, measurements out of data, to get students motivated and engaged at all levels, to promote science in society.

### COORDINATOR

### PREMIUM PARTNERS

### GENERAL PARTNERS





## YOUR ADVICE TO STUDENTS

Be imaginative, stay curious, follow your dreams, work [very] hard!



## YOUR ADVICE TO TEACHERS AND PARENTS

Open/extend your/their horizons, promote the use of critical thinking, motivate them to engage in out-of-the-school activities, especially internships at research institutions.



## LEARN MORE

<http://www.lip.pt>, [home.cern](http://home.cern), [ippog.org](http://ippog.org), [tecnico.ulisboa.pt](http://tecnico.ulisboa.pt), [cienciaviva.pt](http://cienciaviva.pt)

**Attribution CC BY.** This license lets others distribute, remix, tweak, and build upon your work, even commercially, as long as they credit you for the original creation. This is the most accommodating of licenses offered. Recommended for maximum dissemination and use of licensed materials.



### COORDINATOR

### PREMIUM PARTNERS

### GENERAL PARTNERS