

# Portugal and CERN

The development of High Energy Physics in  
Portugal and the cooperation Portugal-Brasil



Mário Pimenta  
CBPF, November 2025

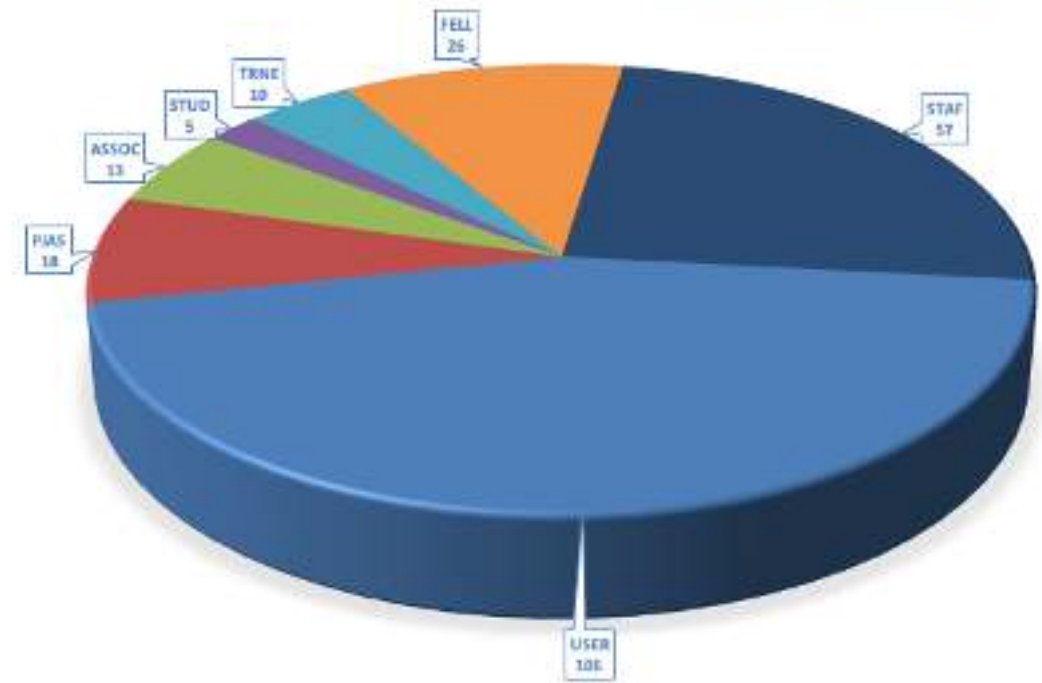
January 1986

Portugal becomes a CERN member



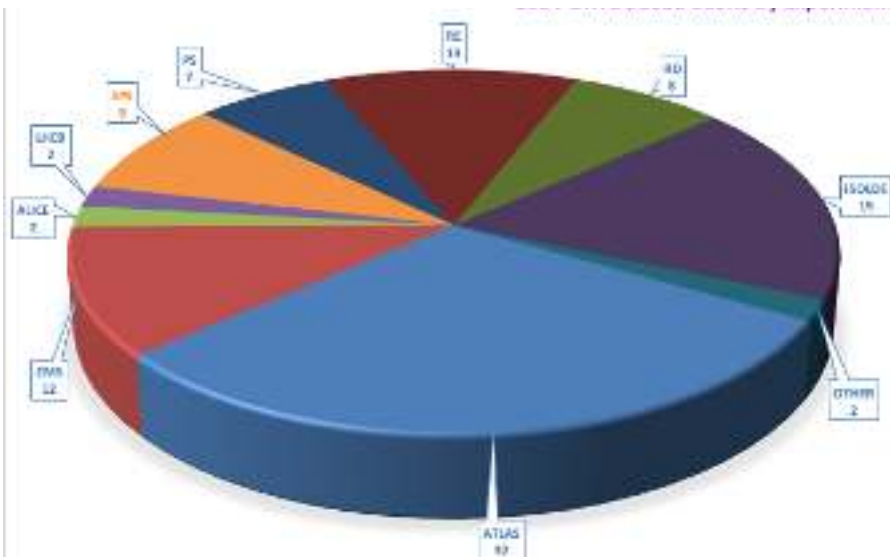
# Today we are ~ 250

with the Portuguese nationality



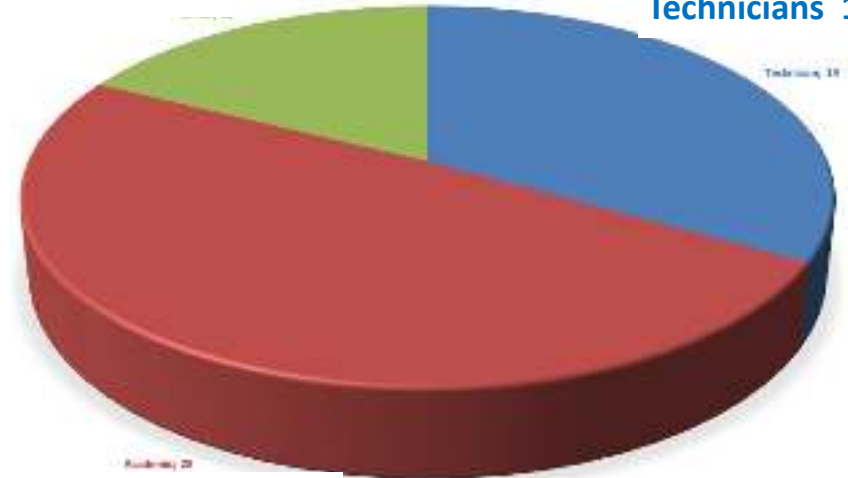
~ 100 in CERN experiments  
but based in Portugal

~ 55 CERN staff



Seniors 10

Technicians 19



Physicians/engineers 28

But what was the CERN impact in Portugal ?

# The Frontiers of the knowledge

The Standard Model

The discovery of the Higgs boson

~250 Portuguese Scientists, Engineers and Technicians in CERN's activities

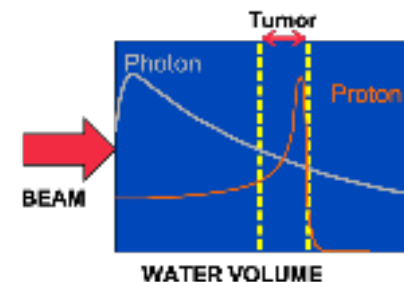
Experimental and Theoretical Physics;  
Material Science, Radioisotopes and  
Medical Applications, Technologies,  
Communication, education and outreach



# The frontiers of the technology

accelerators, detectors, computing

More than 50 Portuguese technology-based companies work with CERN



# The training of engineers and technicians

Engineer program at CERN since 1996, selected by a committee of representatives of the Portuguese industry and scientific community, ~ 200 scholarships

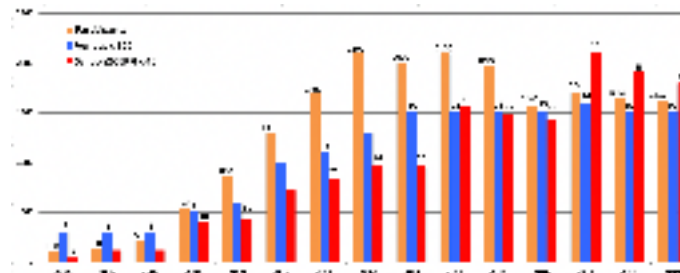


## Education and scientific dissemination

Teacher training program at CERN, school visits, Masterclasses, ...

723 (428 PT) teachers in Portuguese language schools at CERN

more than 20,000 students in Masterclasses





# It was and is a huge challenge ...

- Create the critical mass necessary for full participation in CERN (scientific, technical, and industrial);
- Convince academia that investment in CERN and other large international organizations/collaborations is not made at the expense of other scientific fields;
- Create the conditions for Portuguese industry to compete at CERN;
- Develop advanced training programs in scientific and technical areas;
- Develop education and science outreach programs aimed at secondary schools and the general public.

# The tools ...

- A dedicated funding line (the “CERN fund”) with periodic calls (typically biennial) and an international jury partly appointed by CERN’s management;
- A national institution (LIP) that coordinates participation in most Particle Physics activities and associated technologies, at CERN and in other major international organizations or collaborations (ESA, Auger, SNO+, DUNE, LZ, etc.), with its own human resources and/or shared with Higher Education Institutions;
- A distributed computing infrastructure (INCD);
- The “Industrial Liaison Officer” (ILO);
- International PhD programs (IDPASC, ProtoTera);
- Technical training programs at CERN and ESA (e.g., engineers at CERN);
- Educational programs aimed at secondary education (“Master classes,” teachers’ school at CERN in the Portuguese language);
- Many seminars and lectures ...



# But, what and who made this possible?



Continuous political support over many years and many governments (Fundo-CERN calls, PhD and Training programs, ILOs, ...)

The enthusiasm of many



# Brasil - Portugal

Rio, 3 Março de 2013

## A long-standing collaboration

20th Century (**Roberto Salmeron**)

1980s: NA10, NA14, NA38

1990s: DELPHI

21st Century (**Ron Shellard**)

Institutional agreements:

CBPF – LIP

Brazil – Portugal

Current common projects:

CERN, DUNE, Auger, SWGO

IDPASC

Outreach and education



Lisboa, 31 Maio de 2021



# DUNE, LHC, FCC

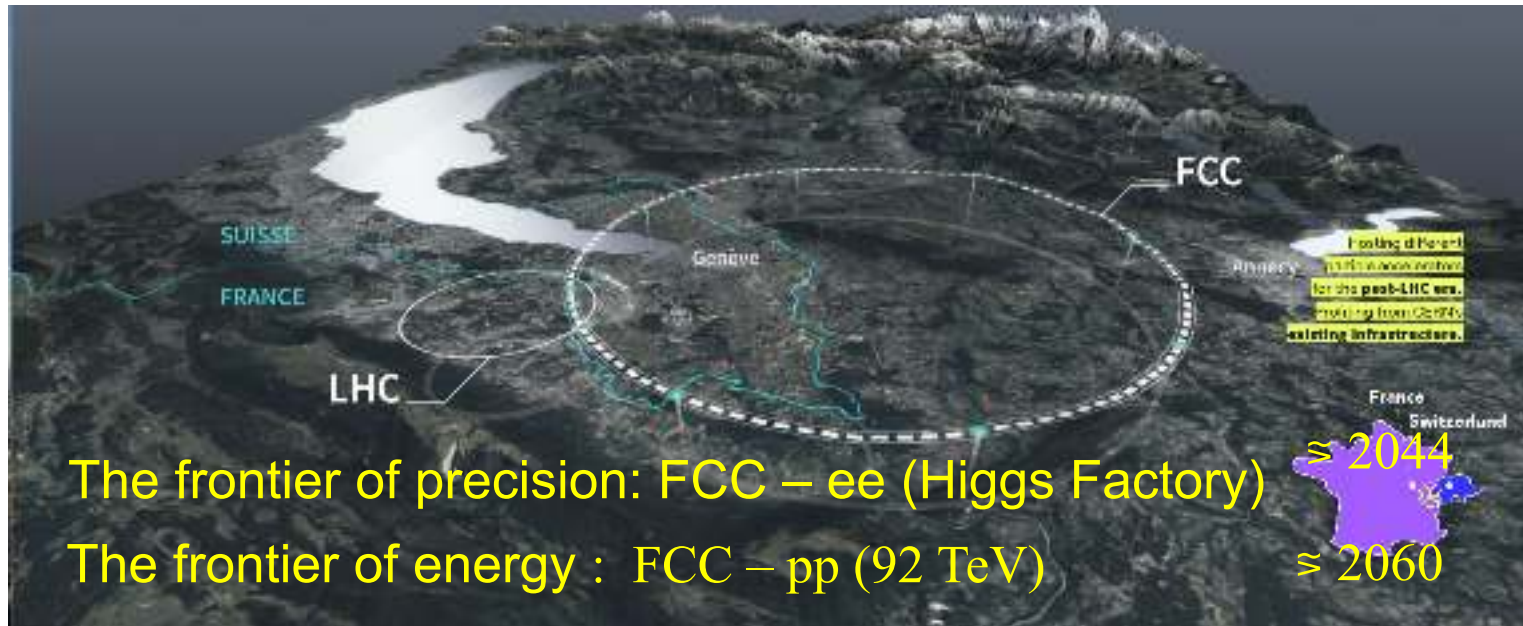
## DUNE

see talk this afternoon by José Maneira

## LHC, LHC-IL

see talk this afternoon by Nuno Castro

## FCC (Future CERN Collider)





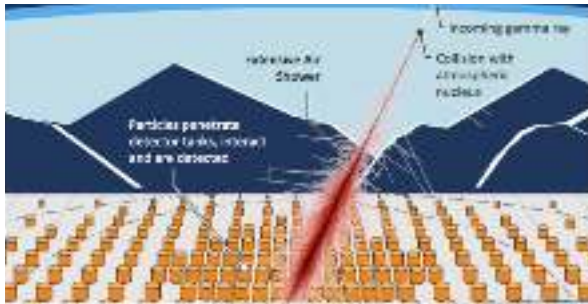
# Astroparticles@South America



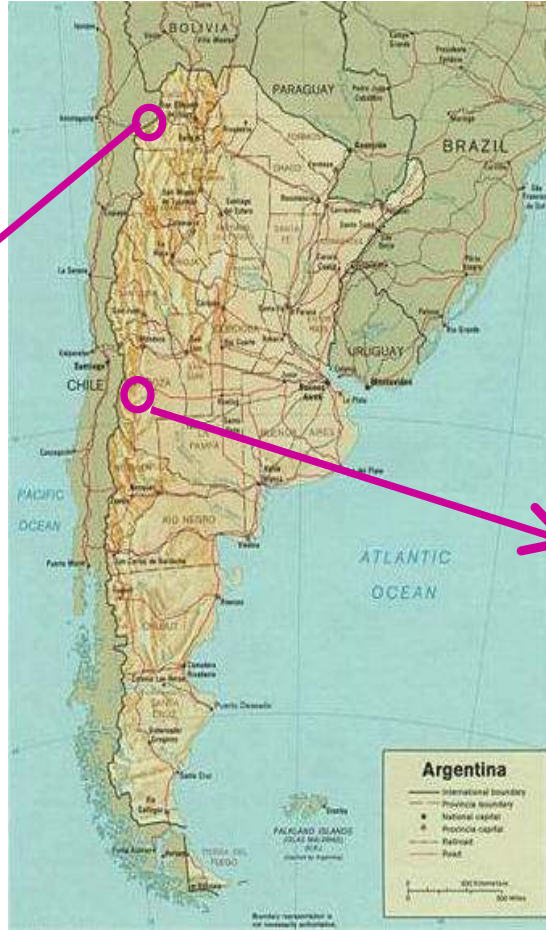
Gamma rays

$10^{11} - 10^{15}$  eV

Area  $\sim 1$  km<sup>2</sup>



to be built in  
Atacama, Chile



PIERRE  
AUGER  
OBSERVATORY

Charged cosmic rays

$10^{17} - 10^{20}$  eV

Area  $\sim 3000$  km<sup>2</sup>



Operating since 2004  
in Malargüe, Argentina

# MARTA

## Muon Array with RPCs for Tagging Air showers

Many RPCs built and assembled in Coimbra, São Carlos, CBPF



MARTA station @Auger



Muon tomograph@CBPF

# Now sealed RPCs @LIP !

RPCs that contain gas but are hermetically sealed after construction, similar to the Geiger-Müller detectors.

- Improved portability and simplified maintenance
- Without gas system/gas consumption the system is even much cheaper.

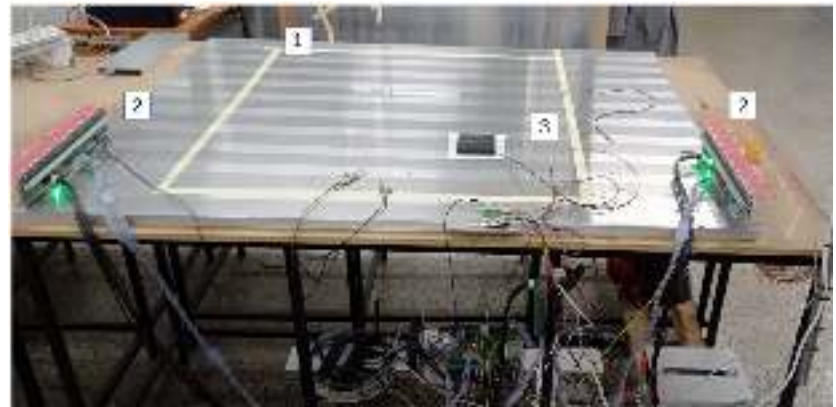
## Medium size 0.1 m<sup>2</sup> sRPCs telescope

Already installed @ SND@LHC experiment  
and @irradiation facilities



1- sRPC planes, 2 – FEE used to readout the signals from sRPC, 3 – High Voltage PS system, 4 – DAQ, computer and power supplies.

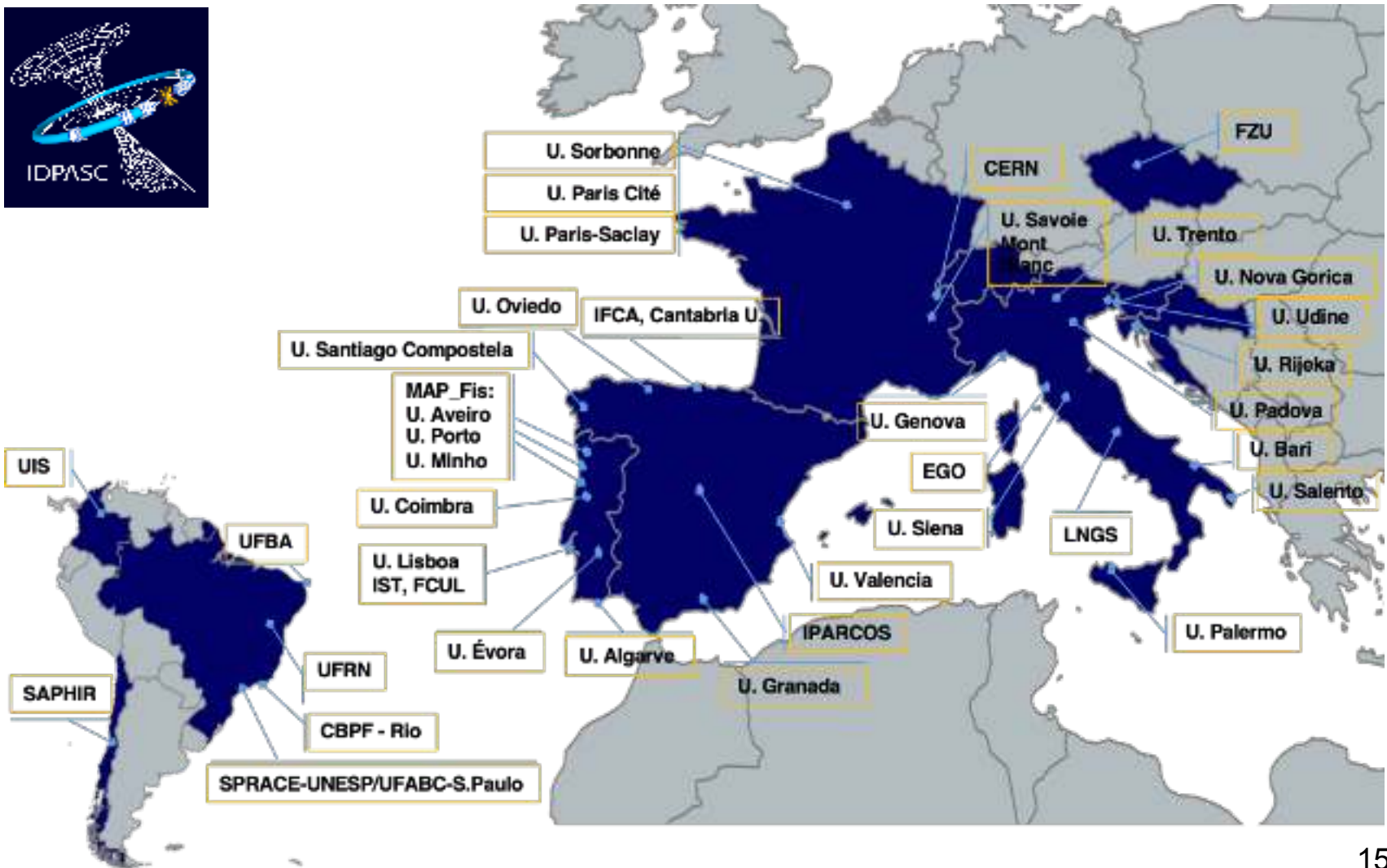
## Large size 1 m<sup>2</sup> sRPC





# IDPASC

# International Doctorate Network in Particle Physics, Astrophysics and Cosmology



# IDPASC SCHOOL 2026

NATAL-BRAZIL PROPOSAL



# Education and Outreach

Since 2009

## CERN Portuguese Language Teacher Programme



245 Brazilian high school teachers  
( 2009-2019)





# Key players in epic times

Ron Shellard (1948-2021)

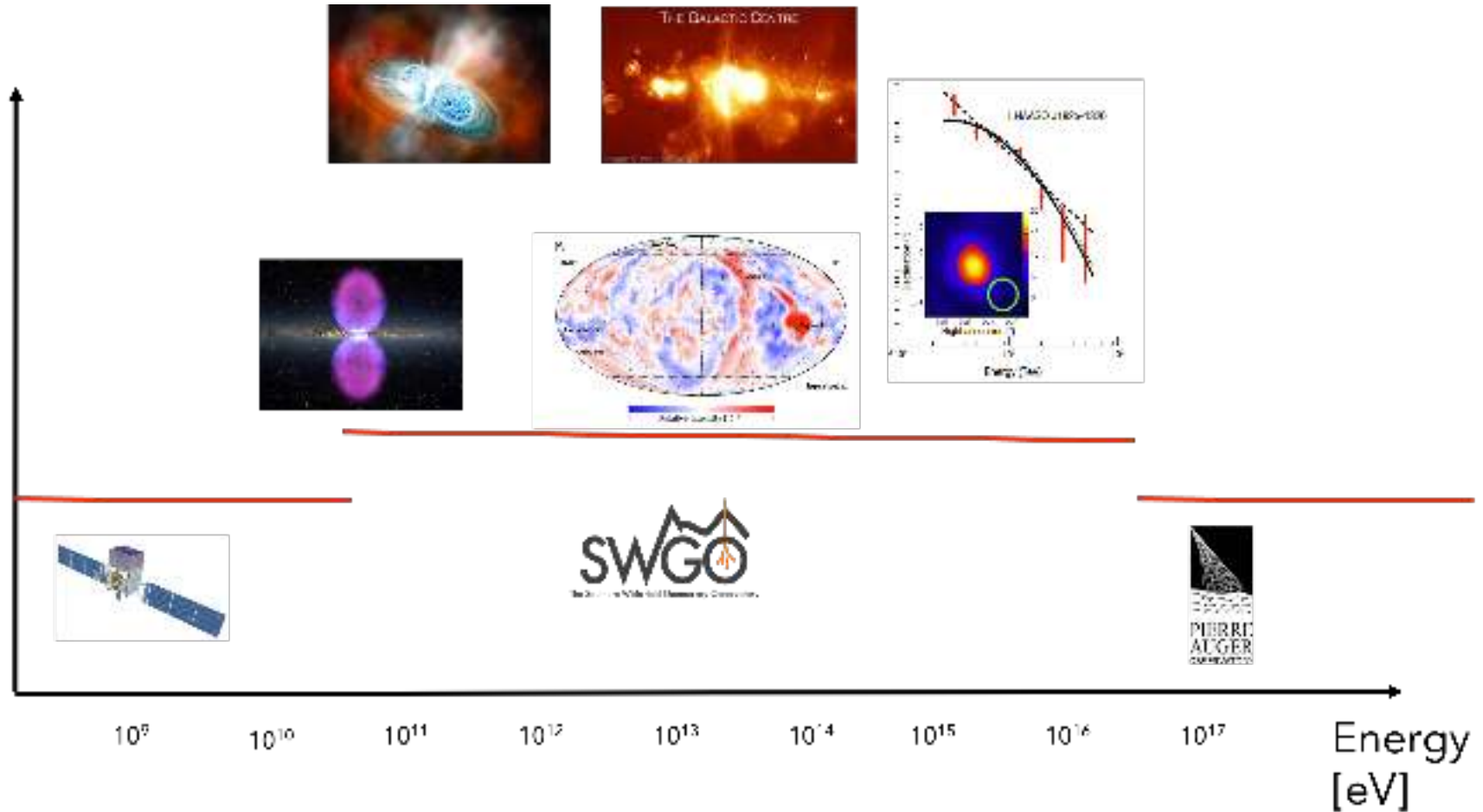


Gaspar Barreira (1940-2019)

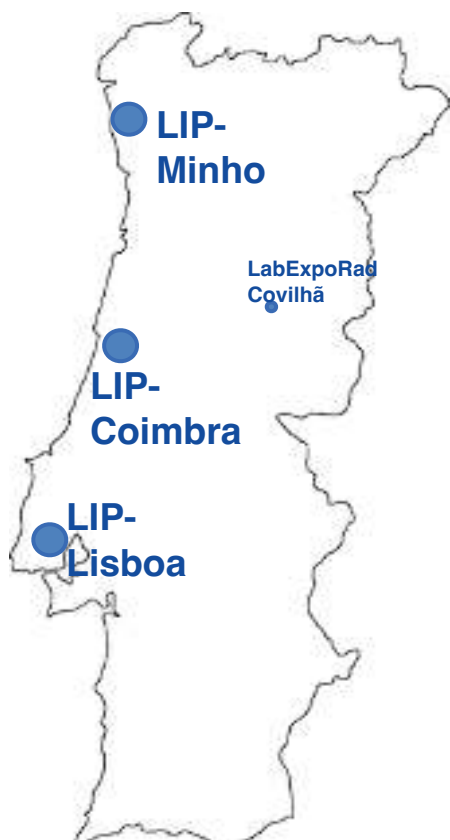




# SWGO: energy range







# Brasil país associado do CERN



Julho 2012  
Pedido formal



Junho 2019  
Visita ao CERN ministro  
Marcos Pontes



3 Março 2022  
Assinatura acordo de adesão

Over many years, Ron was also instrumental in the process for Brazil to become a CERN Associate Member State. We are saddened that he will now not witness the outcome of his efforts in the next years, and all opportunities these will open for Brazilian students and scientists.

Yours sincerely,  
  
Joachim Mnich