



LABORATÓRIO DE INSTRUMENTAÇÃO
E FÍSICA EXPERIMENTAL DE PARTÍCULAS
partículas e tecnologia

LIP and CERN

Portugal@CERN

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www.lip.pt

January 1986

Portugal becomes a CERN member



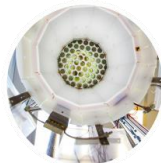
LIP

was created in 1986

As the Portuguese reference partner of CERN and is the reference institution for experimental particle physics in Portugal



Experimental particle and astroparticle physics



Development of new instruments and methods



Scientific computing

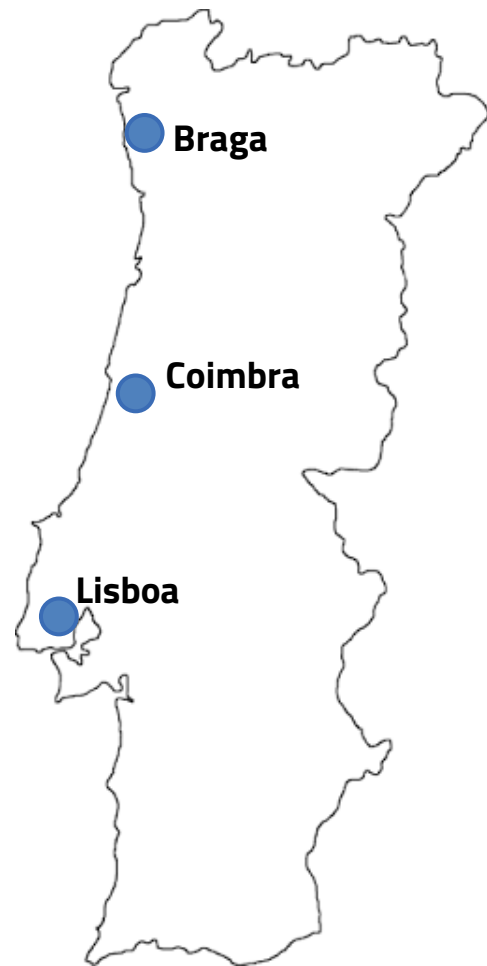
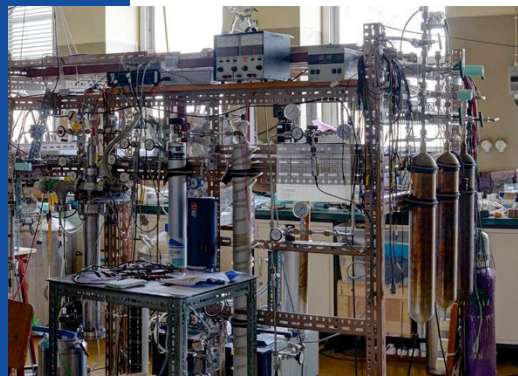


Knowledge transfer, education and outreach

WHERE

LIP IS

A nation-wide laboratory
working in close
collaboration with the
local universities





Contributions to the ATLAS and CMS experiments at LHC



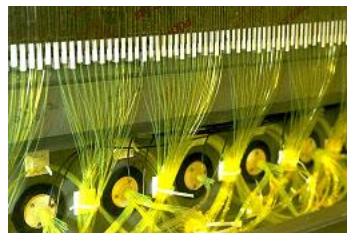
LIP is a member of ATLAS since 1992



Major role in the construction of the TileCal Hadron Calorimeter and Trigger/Data Acquisition system, in collaboration with industry and technology institutes



Robot for fiber insertion.
600 000 fibers inserted in
Lisbon and later in Coimbra



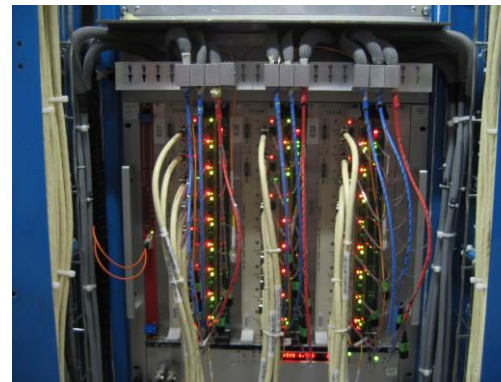
WLS optical fibers routing.
Fiber aluminization done in
Lisbon

Detector Commissioning and Operation
Data analysis

LIP is a member of CMS since 1992



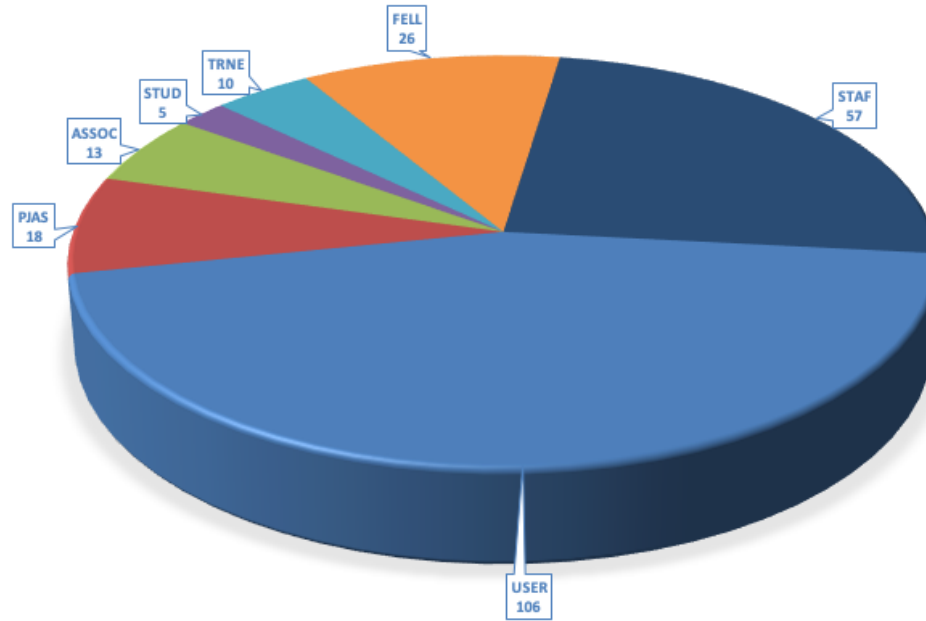
Major role in the construction of the Trigger and Data Acquisition of the Electromagnetic Calorimeter, in collaboration with industry and technology institutes



ECAL Trigger/DAQ hardware:
18 Crates;
240 Modules;
1200 Mezzanines
3000 optical links;
2500 electrical links

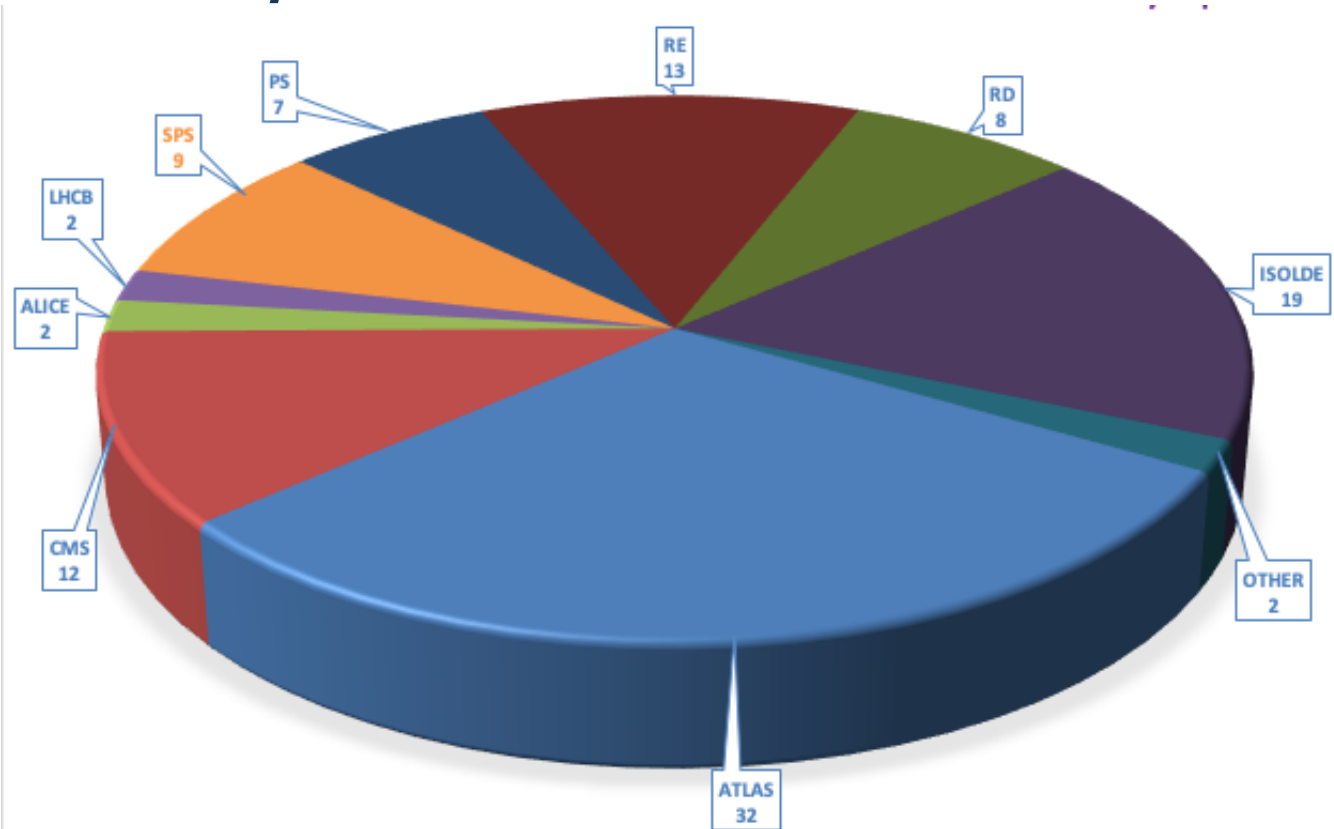
Detector Commissioning and Operation
Data analysis

~250 Portuguese scientists, students and technicians at CERN

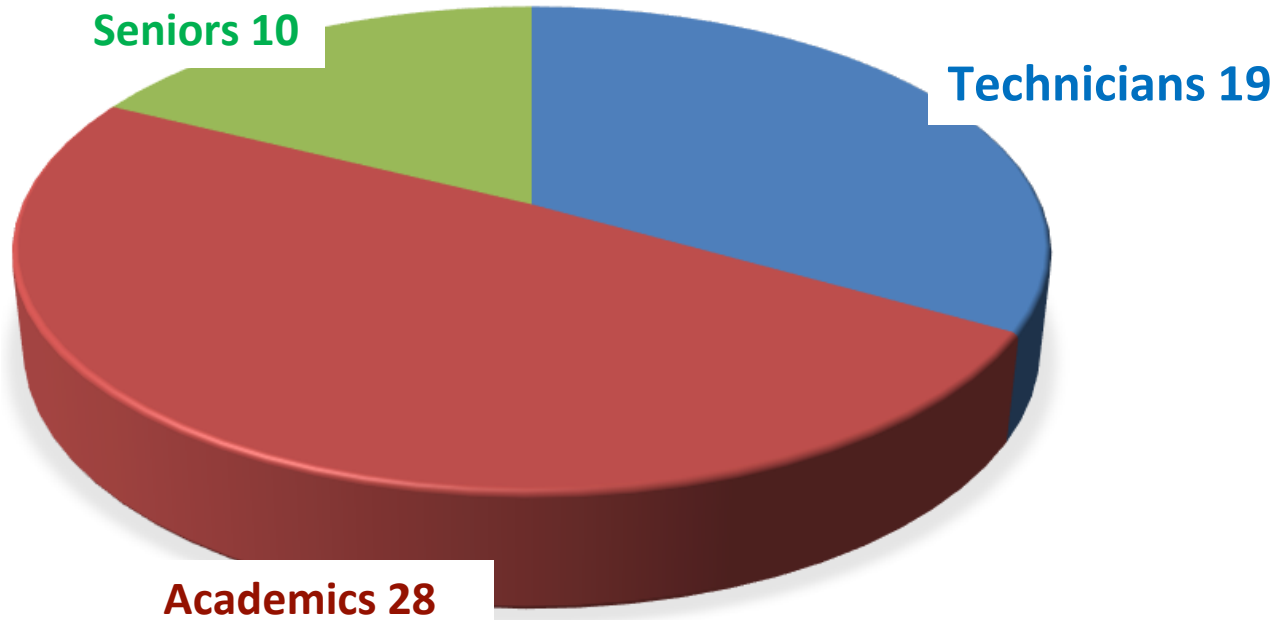


100 in CERN experiments, based in Portugal

Distribution by Collaboration



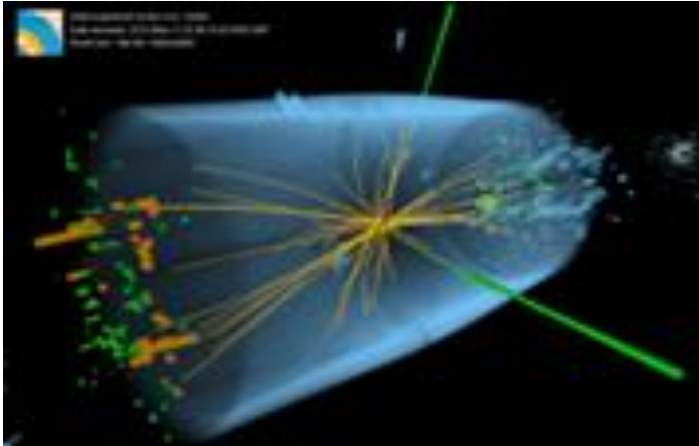
~55 Portuguese Staff members at CERN



But what has been the impact of CERN in Portugal?

At the frontiers of knowledge

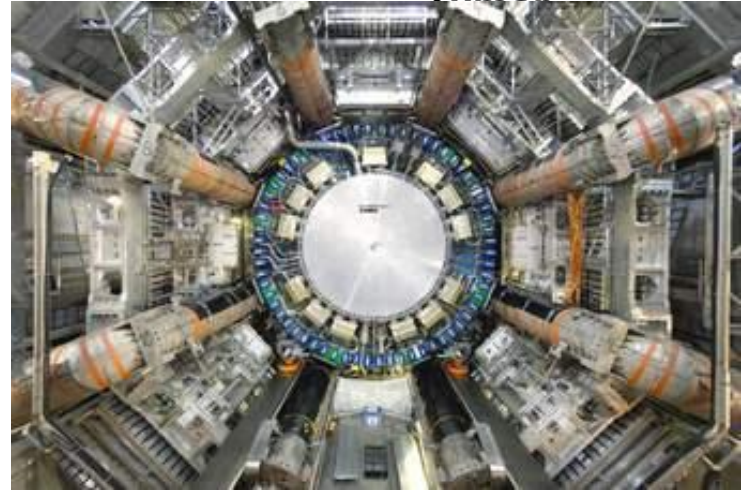
The Standard Model
The discovery of the Higgs boson



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

At the frontiers of technology

Accelerators, detectors, computing



More than 50 Portuguese technology-
based companies have worked with
CERN

At the frontiers of knowledge

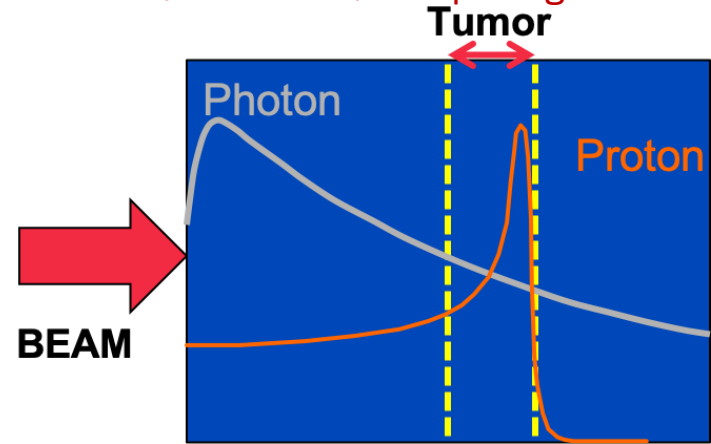
The Standard Model
The discovery of the Higgs boson



Experimental and Theoretical Physics;
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At the frontiers of technology

Accelerators, detectors, computing



WATER VOLUME

More than 50 Portuguese technology-based companies have worked with CERN



Training of engineers and technicians

Program of Engineers at CERN since 1996, selected by a committee of representatives of the Portuguese industry and scientific community,

~ **200 scholarships**



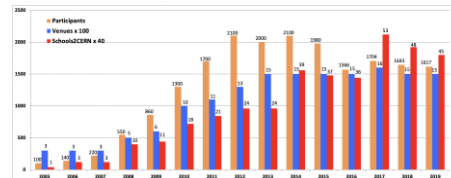
Education and scientific dissemination

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



How was this made possible?



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FCT Fundação
para a Ciência
e a Tecnologia

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

... and the enthusiasm of many!





Portugal and CERN



- **Portugal joined CERN as a Member State in 1986**
- The Laboratório de Instrumentação e Física Experimental de Partículas (LIP) was created at the same time to carry out all activities related to experimental particle physics, involving researchers coming from universities, as well as LIP's scientific staff
- Strong participation in LHC (ATLAS, CMS) and non-LHC (CLOUD, COMPASS, ISOLDE, nTOF) programmes and strong partner in the GRID
- Strong participation in R&D programmes for medical application (Clear PEM, PET consortium)
- Training/Education:
 - Excellent example of the engineer training programme
 - Very successful teacher training and outreach programmes
- Very balanced approach between contributions at CERN and investments at home and very good industrial relations



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Thanks!

**Discovery
through
science**

**Innovation
through
technology**

**Sharing
with
People**