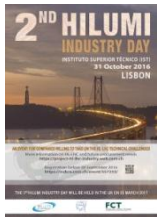




LIP in a nutshell



Mário Pimenta
Lisboa, October 2016

Laboratory of Instrumentation and experimental Particle physics

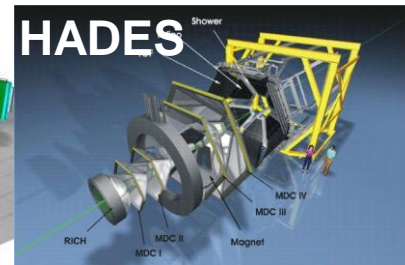
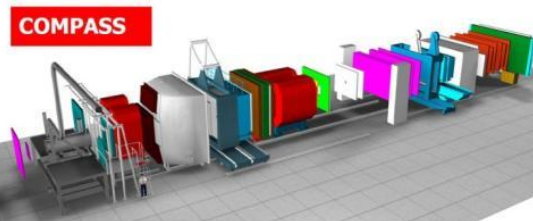
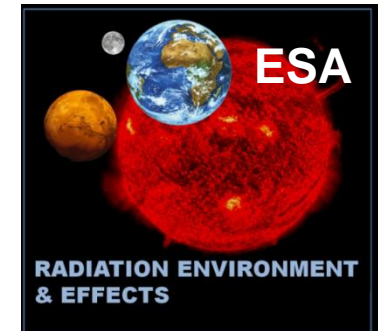
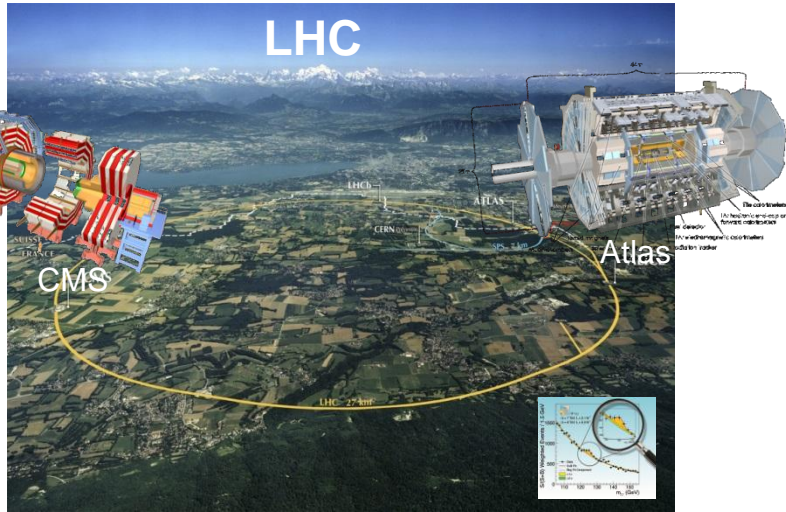
Coimbra, Lisboa e Minho

- ~ 200 members
- ~ 90 PhD
- ~ 75 students
- ~ 25 engineers. and technicians
- 7 administrative staff

- Experimental Particle and Astroparticle
- Development of new Instruments and Methods
- Computing

From CERN/GSI to the Argentinean Pampa

From deep underground mines to the space

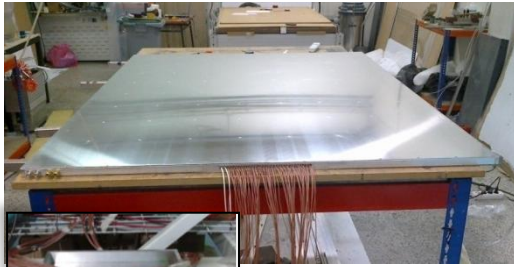


Researches Infrastructures in Portugal



R&D in detectors and instrumentation

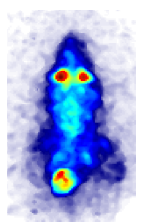
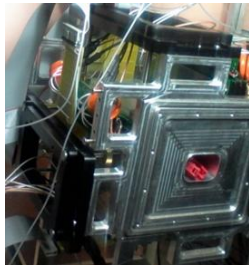
RPCs detectors



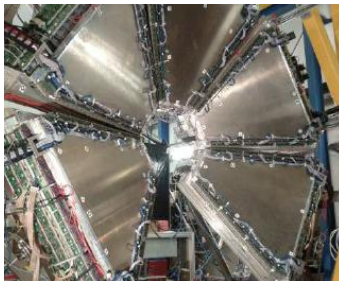
To the Pampa



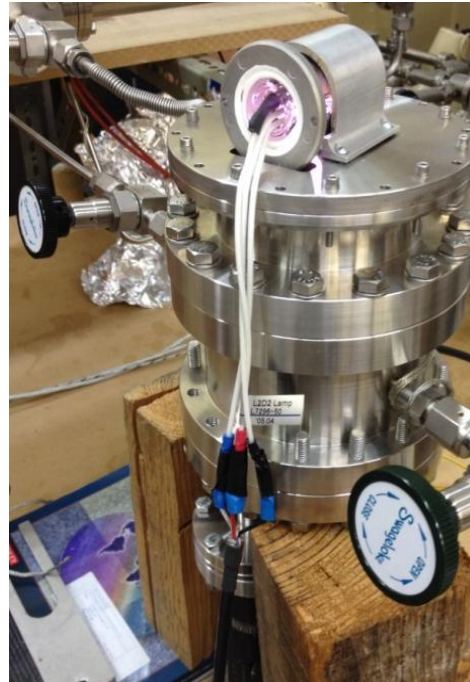
To animal
and human
PET



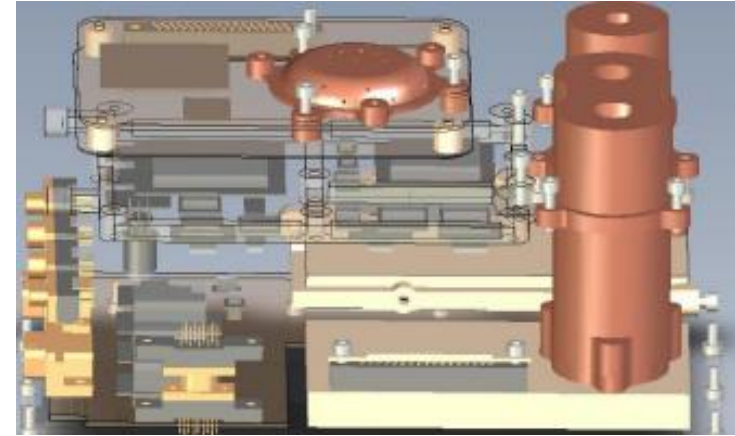
to Particle
Physics



Xenon Detectors



Radiation detectors for space mission



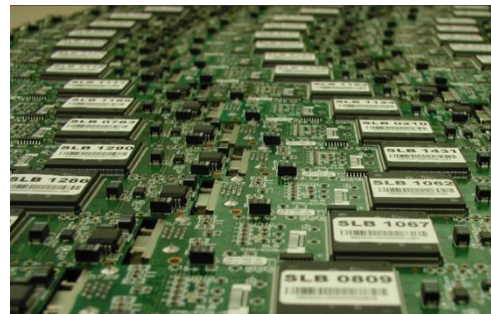
RADEM – Radiation hard electron monitor
(LIP: design of the radiation detector)

Clear-PEM



Industrial consortium led by LIP

Digital Electronics



Reference Technologies

Gaseous Detectors

- Resistive Plate Chambers (RPCs)
- Liquid / Double Phase Xe Detectors
- Thermal Neutron Detectors
- Gas Scintillation Proportional Counters

Calorimeters

- Scintillating Crystals based Electromagnetic Calorimeters
- Low energy photon detectors
- Scintillating fibers based Hadronic Calorimeters

Electronics and data acquisition

- Microelectronics, optoelectronics and FPGA based systems
- Data acquisition and detector control systems

Simulation

- Detectors (Geant4)
- Radiation environment (space, ...)
- Physics process (generators)



LIP@HILUMI: CMS

CMS Electromagnetic Calorimeter

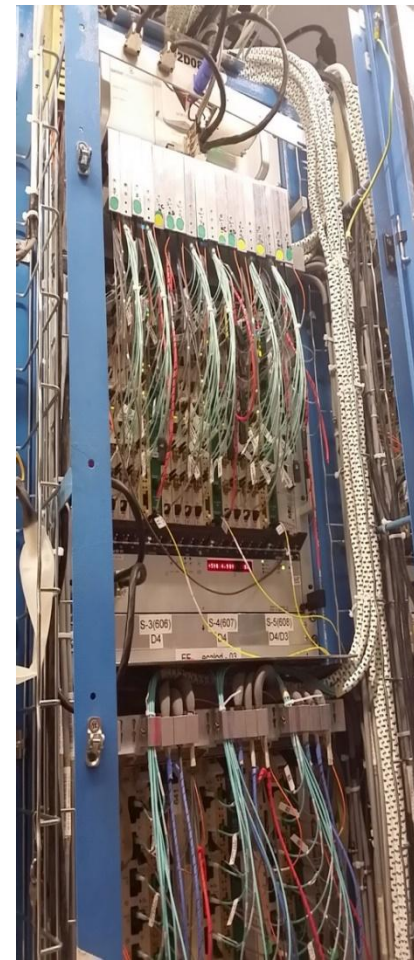
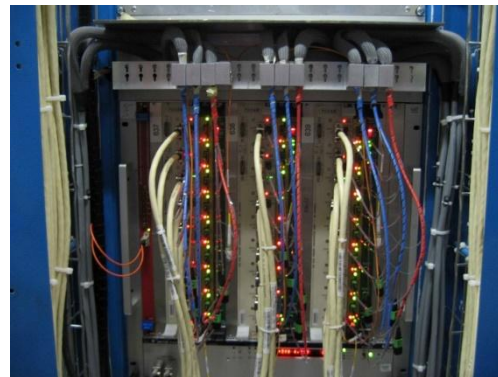
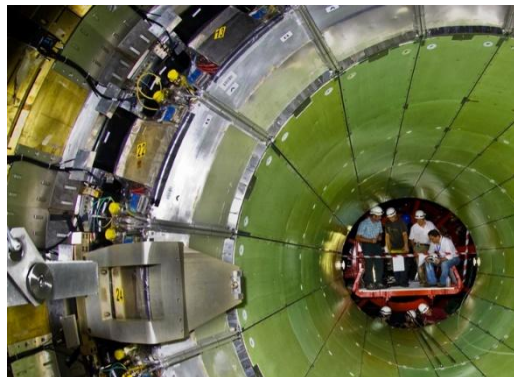
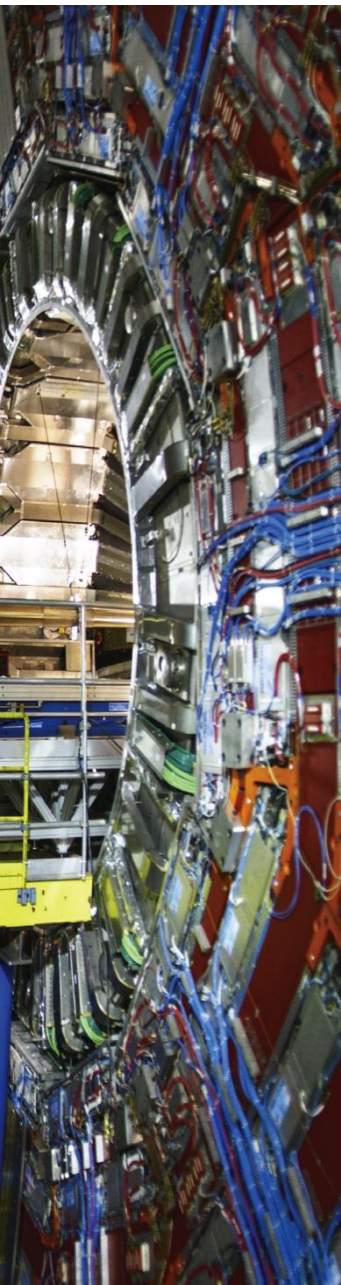
Participation in the development of photon and electron detectors based on Scintillating Crystals (PbWO_4) and Avalanche Photodiodes (APDs)

CMS CONSTRUCTION

- 18 Crates; 240 Modules;
- 1200 Mezzanine boards

CMS UPGRADE

- **Trigger \leftrightarrow ECAL optical links**
- **Timing detectors for the CT-PPS**



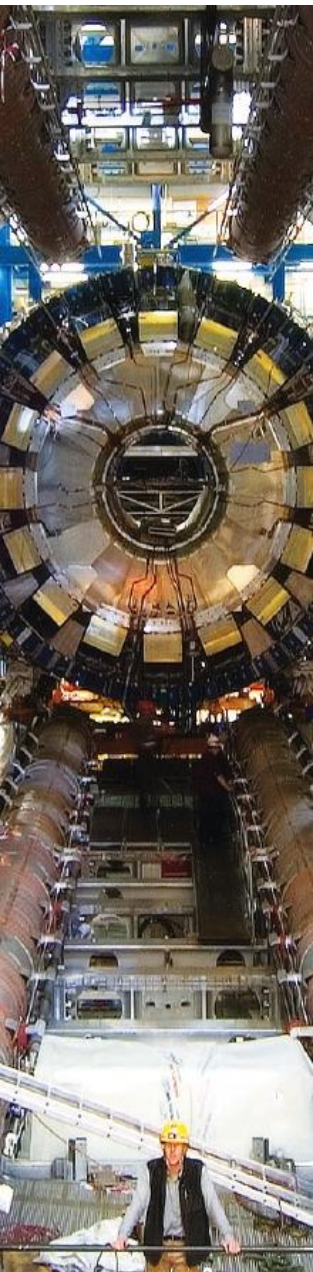
LIP@HILUMI: ATLAS

ATLAS hadron calorimeter TILECAL

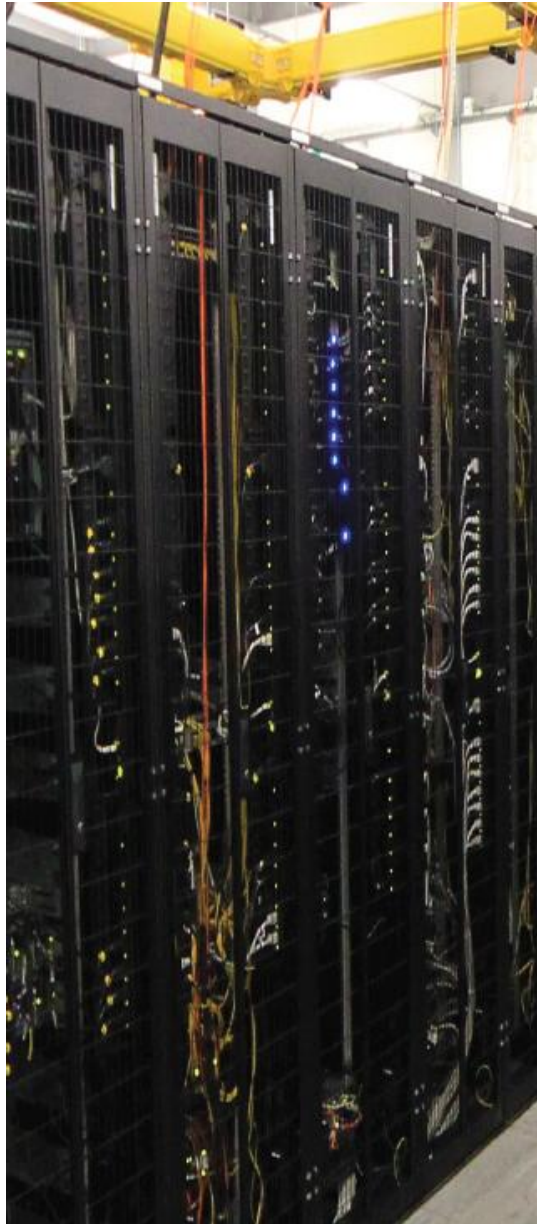
- Selection and characterization of plastic WLS optical fibers and scintillators
- Aluminization of WLS fibers
- Setting the ~600 000 optical fibers in bundles, before assembly of the modules

ATLAS UPGRADE

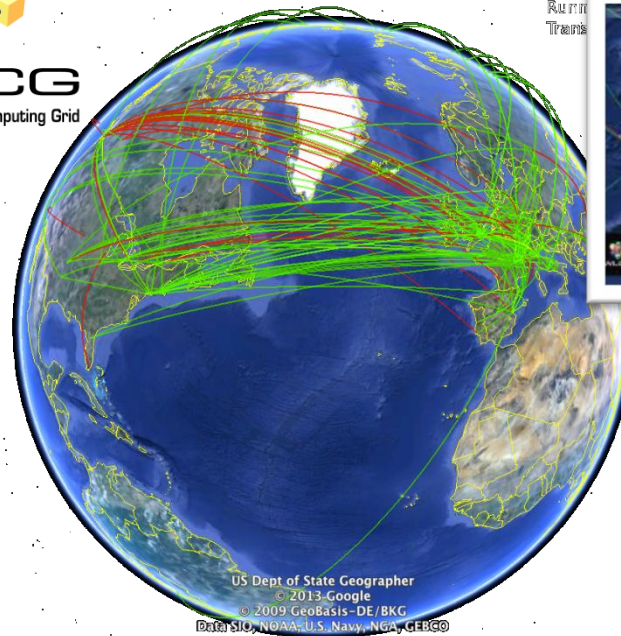
- **TILECAL: Phase I (2018-2019)**
Gap scintillator/fibres replacement ; Tile-muon trigger: Last TileCal layer for muon trigger
- **TILECALCAL Phase II (2013-2025)**
Extension of Tile-muon trigger to the full barrel ; Detector electronics replacement . HV boards
- **Trigger** : GPUs
- **Forward detector**: detector control system



Scientific computing



- R&D in Information and communication technologies
- Participation in national and international projects and infrastructures
- Support to the scientific community



US Dept of State Geographer
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Data: SIO, NOAA, U.S. Navy, NGA, GEBCO

Good meeting!