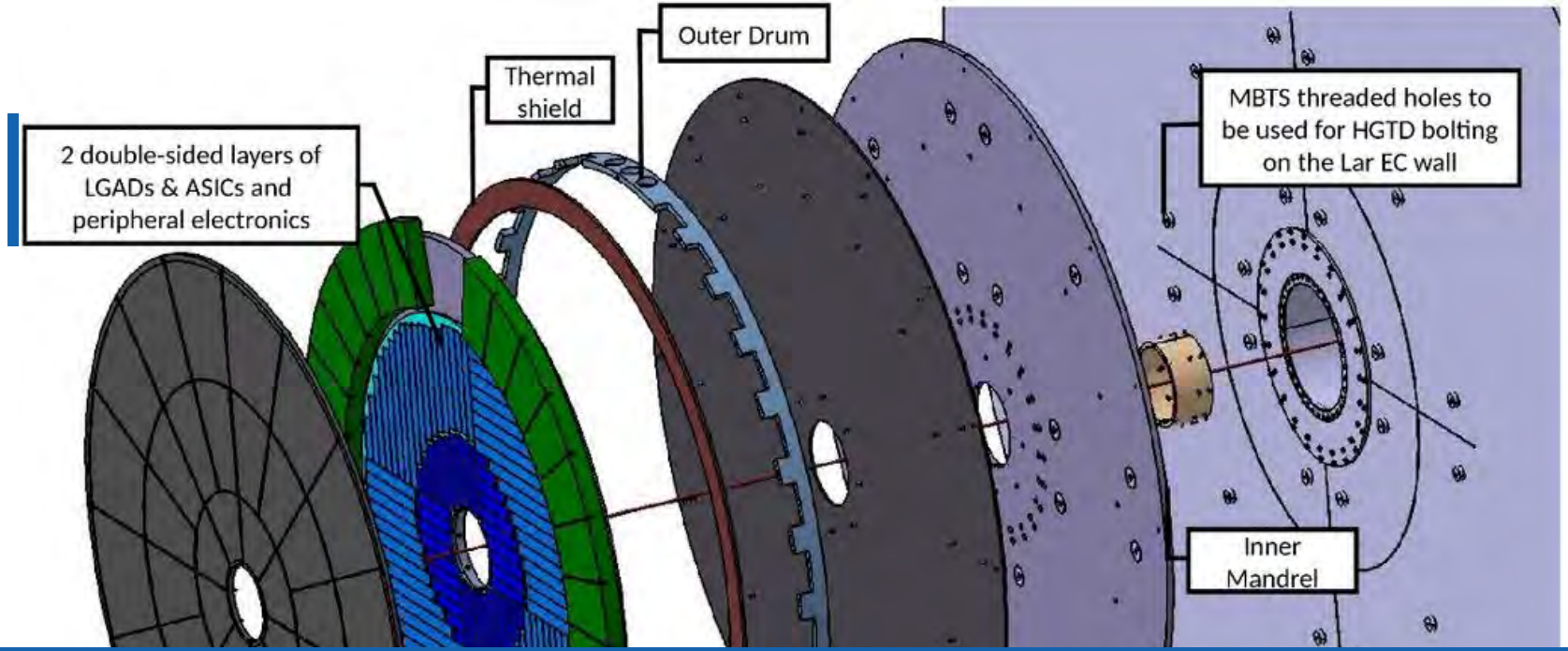


LIP – Joining Proposal

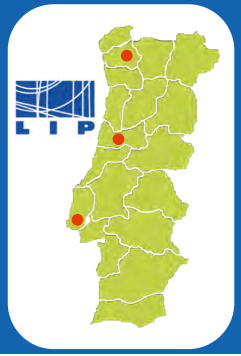
LIP

ATLAS EXPERIMENT

Portuguese ATLAS Team

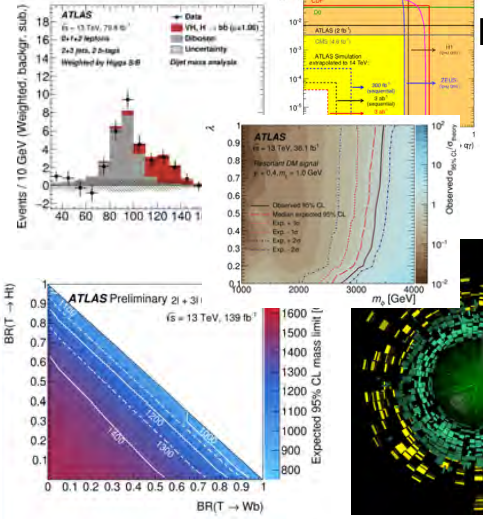
National group:

LIP (Lisbon, Coimbra, Minho), IST, FCUL, FCTUC, U. Minho, CFNUL
CEFITEC/UNL, INESC, CFMC, AdI engineer training program



Current Portuguese Contributions to ATLAS

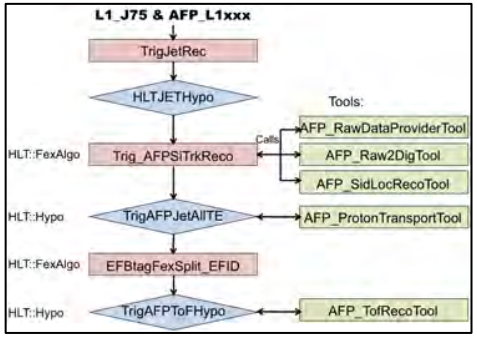
Physics:
Higgs, Vector-Like Quarks, top, heavy ions, forward physics, Dark Matter



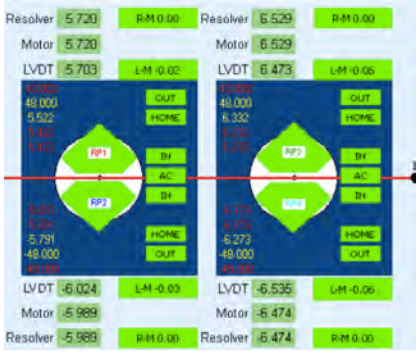
Distributed computing

Iberian Cloud Coordination

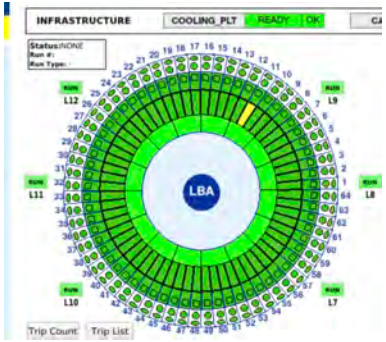
Jets HLT



ATLAS Roman Pot DCS and HLT

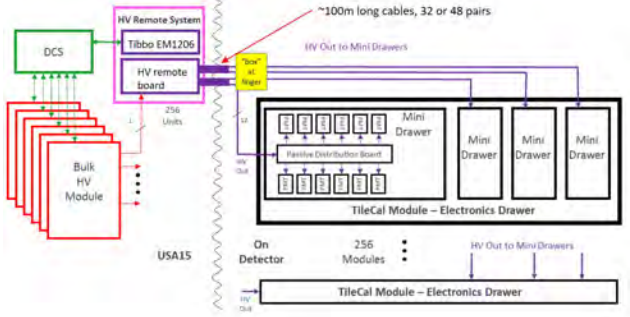


Co-leading ARP DCS



Leading TileCal DCS

TileCal Upgrade HV distribution system



HGTD Involvement: HV Patch Panels

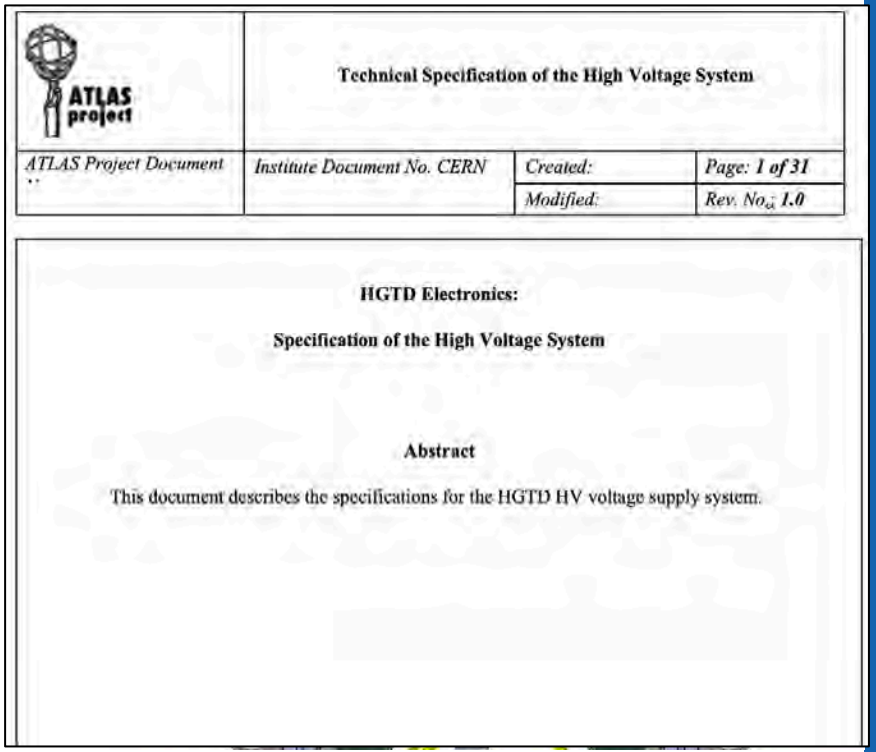
Producing HV patch panels CERN group:

- 16 patch panel boxes located around the calorimeter perimeter
- Routing of High Voltage to HGTD detector
- Filtering out AC noise
- Preliminary layout done and prototype tested
- Contributing to Specifications Review (SPR) document
- Ricardo coordinating Patch Panels (L3)
- Team: 2 engineers, 1 academic

Luís Lopes

Orlando Cunha

Ricardo Gonçalo



ATLAS project

Technical Specification of the High Voltage System

ATLAS Project Document	Institute Document No. CERN	Created:	Page: 1 of 31
		Modified:	Rev. No.: 1.0

HGTD Electronics:

Specification of the High Voltage System

Abstract

This document describes the specifications for the HGTD HV voltage supply system.

DCS and Interlocks

- HGTD DCS – ongoing work:
  Filipe:
  - Contributed to DCS Specifications Review document
  - Working on DCS temp. sensor setup and HV DCS
  - Collaborating with student from Morocco (Yassine)

  Rui:
  - Adapting ITk solution to read DCS data through FELIX
- Interlocks (Helena, Guiomar):
  - Planning HGTD interlock from ITk solution
  - Guiomar will contribute to electronics (HV protection signal for HGTD and Pixels)
- Team: 2 engineers, 1 researcher, 2 academics

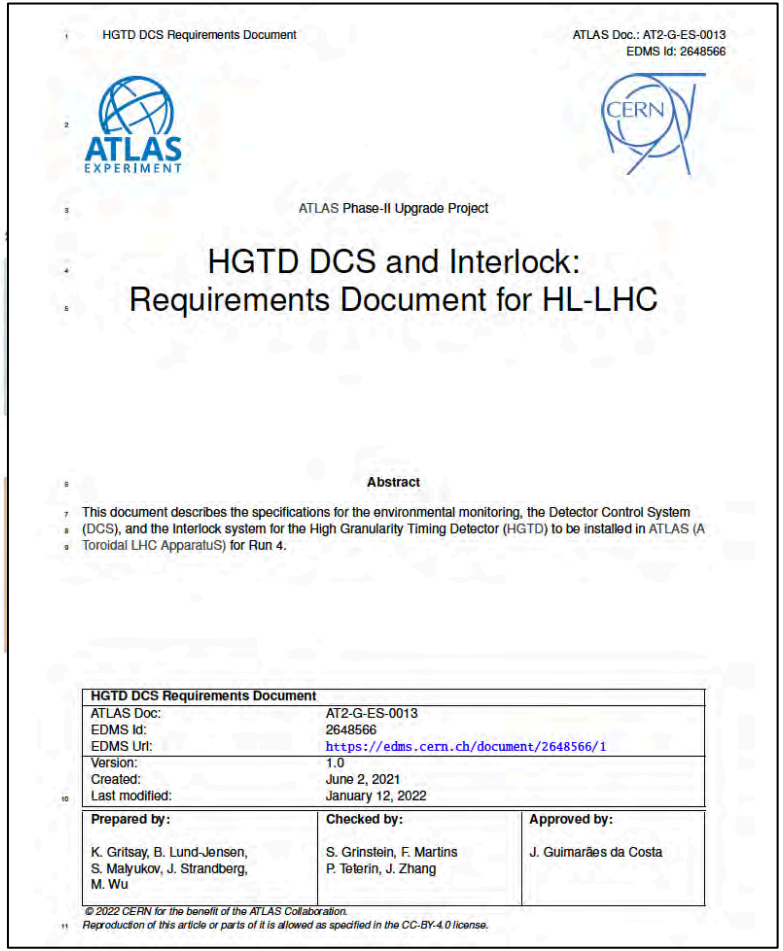

Filipe Martins


Rui Fernandez


Helena Santos


Guiomar Evans


R Gonçalo


HGTD DCS Requirements Document

ATLAS Doc.: AT2-G-ES-0013
EDMS Id: 2648566

ATLAS Phase-II Upgrade Project

HGTD DCS and Interlock:
Requirements Document for HL-LHC

Abstract

This document describes the specifications for the environmental monitoring, the Detector Control System (DCS), and the Interlock system for the High Granularity Timing Detector (HGTD) to be installed in ATLAS (A Toroidal LHC ApparatuS) for Run 4.

HGTD DCS Requirements Document	
ATLAS Doc:	AT2-G-ES-0013
EDMS Id:	2648566
EDMS Url:	https://edms.cern.ch/document/2648566/1
Version:	1.0
Created:	June 2, 2021
Last modified:	January 12, 2022

Prepared by:	Checked by:	Approved by:
K. Gritsay, B. Lund-Jensen, S. Malyukov, J. Strandberg, M. Wu	S. Grinstein, F. Martins P. Teterin, J. Zhang	J. Guimarães da Costa

Electronics: Altiroc

- Characterization of Altiroc
  - Installing a test setup at LIP following very useful visit to Omega laboratory (thanks!)
  - Previous experience with Omega ASICs and frontend electronic design & production
- Team: 1 engineer (Rui)

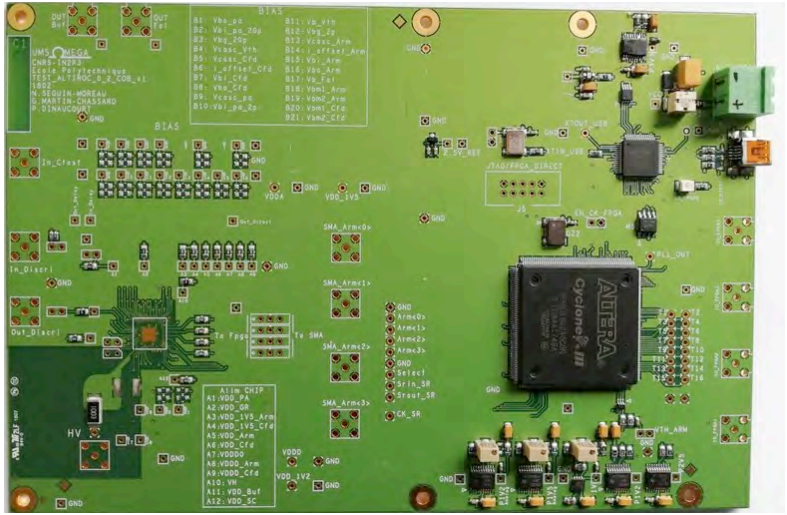
(with support from senior engineer Miguel and 2 academics)

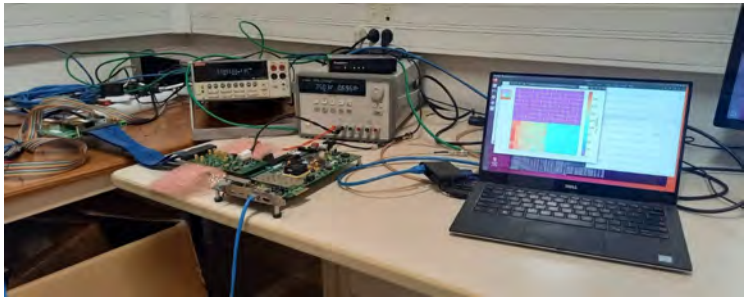

Rui Fernandez


Miguel Ferreira


Pedro Assis


Ricardo Gonçalo



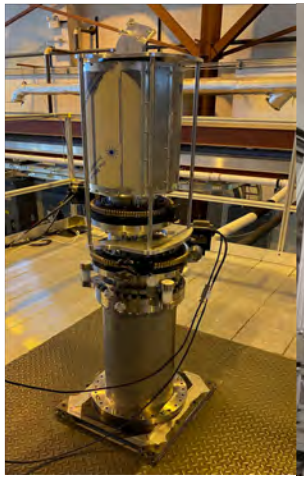


Other local capabilities: Mechanics

Mechanical workshop at LIP-Coimbra has a long experience in producing instruments and structures for various experiments, e.g.:

- Proto-Dune laser calibration periscope
- SND (SHIP) support structures
- HADES TOF detector & support
- TileCal – optical fibre assembly
- Brain TOF-PET tomograph

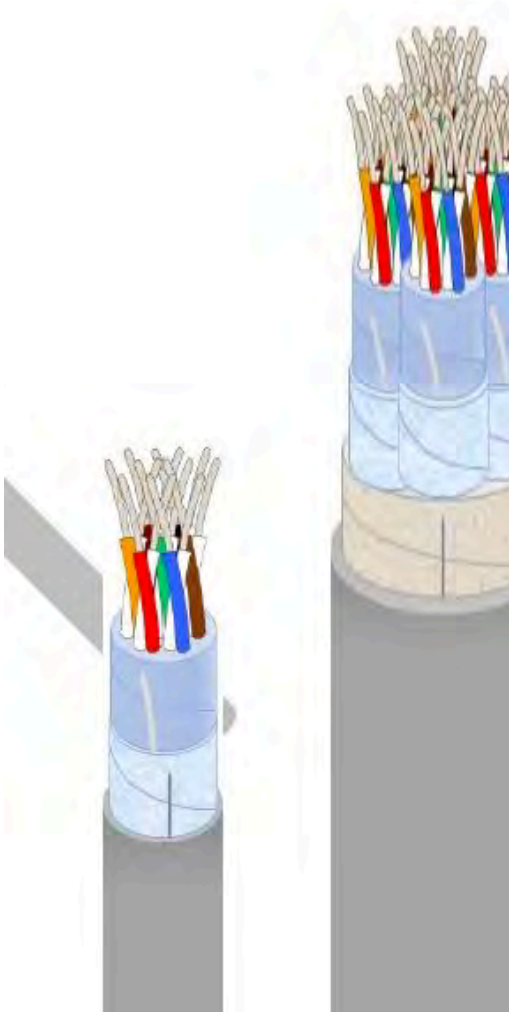
Can provide help in construction or design if required





Other possible contribution: HV Cables

- We are currently responsible for the production of the upgraded TileCal HV distribution system, to supply HV to 10k PMTs
- Similar requirements as for HGTD HV
- 100 m long cables from USA15 to detector: 32 or 48 pairs
- Voltage: average 750 V ± 0.5 V (up to 900 V)
- Current: 400 μA
- Cable prototype (48 pairs) exists:
- Ø 0.4 mm wires; Ø 16.5 mm cable



Team involved in HGTD

- 9 people at various levels of commitment
- About 3 FTE in total
- Expect future engagement from students (Qualification Tasks, etc)

R. Gonçalo, academic, coordinating effort

Luís Lopes, engineer: mechanics

Orlando Cunha, engineer, Patch Panel electronics

Filipe Martins, engineer, DCS

Helena Santos, researcher, Interlock

Guiomar Evans, academic, Interlock board design

Rui Fernandez, engineer, DCS firmware and ALTIROC tests

Miguel Ferreira, engineer, electronics board design

Pedro Assis, academic, electronics

HGTD Joining Proposal – Summary

- LIP team contributing or starting to contribute in Electronics and DCS tasks
  - Electronics: HV (patch panels), ASIC (tests)
  - Lumi/DAQ/DCS: DCS and Interlocks

- Expected contribution to CORE costs: between 150 and 300 kCHF
  - Details being discussed – need to change MoUs (to be negotiated with funding agency) to move funds allocated to HTT

- Several other possible contributions using LIP facilities in cable production and mechanics design or part production

Thanks!

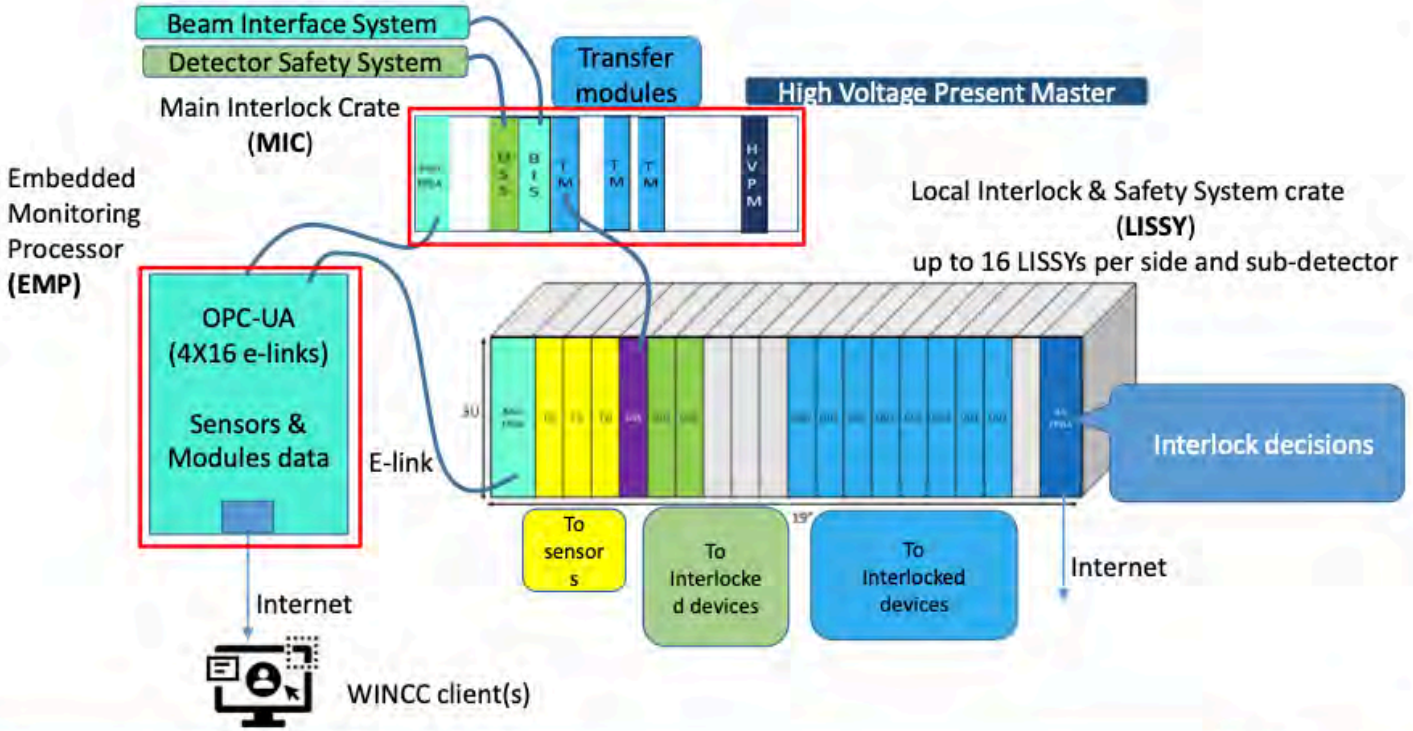
Acknowledgments

REPÚBLICA PORTUGUESA

FCT Fundação para a Ciência e a Tecnologia

Backup

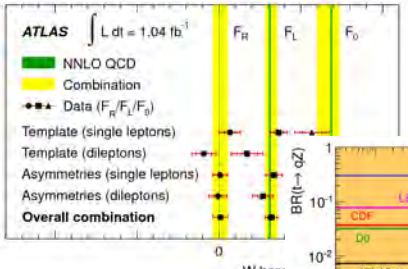
The ITk Interlock elements in the production system

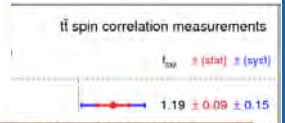


Portuguese contributions to ATLAS Physics Results

Top quark properties

Top properties measurements

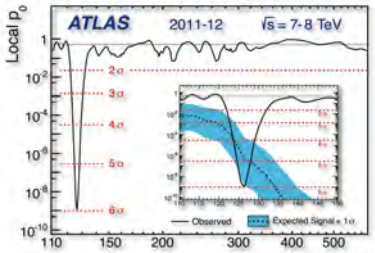


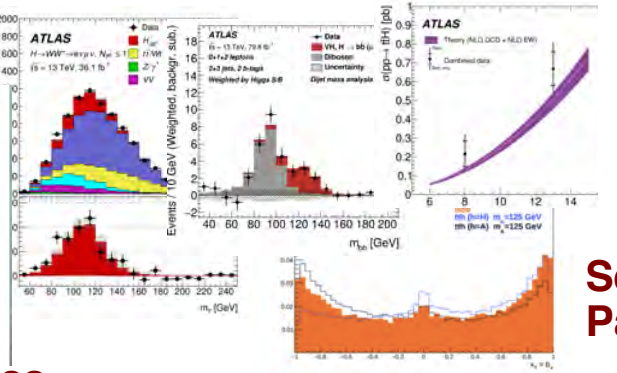


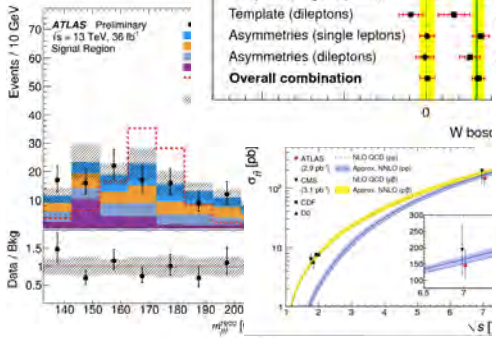
Higgs boson discovery and properties

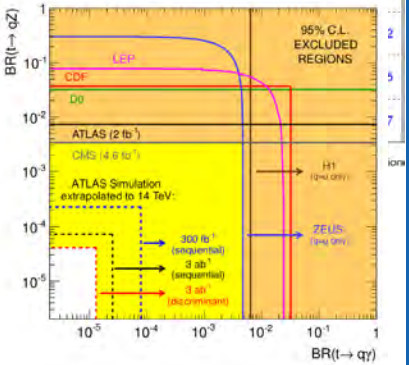
H→WW, H→bb, ttH

Spin/CP properties







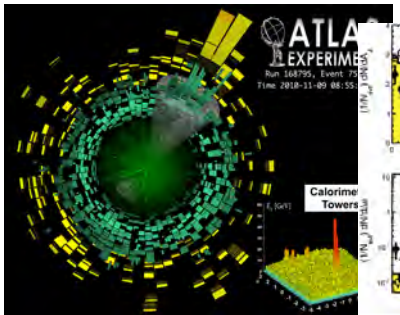


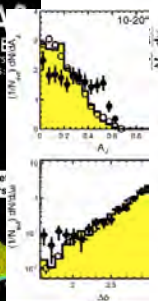
Searches for New Particles & Interactions

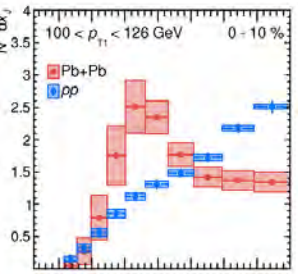
Vector-like quarks, FCNC, dark matter, …

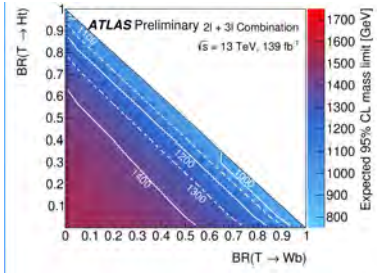
Heavy Ion Physics

QGP jet quenching

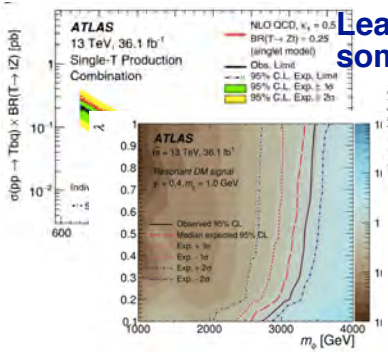


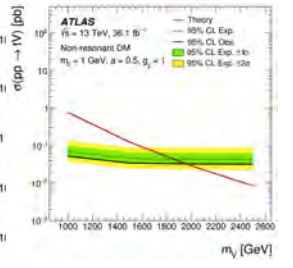






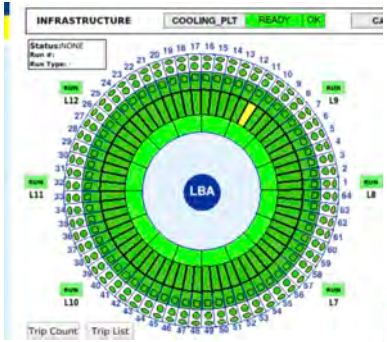
Leading positions in some analysis





Current Portuguese Contributions to ATLAS

TileCal Calibration, DCS

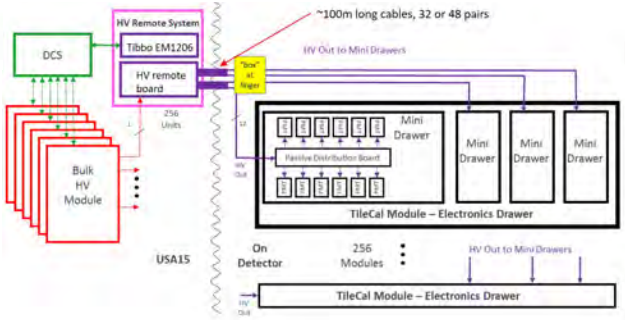


Leading TileCal DCS

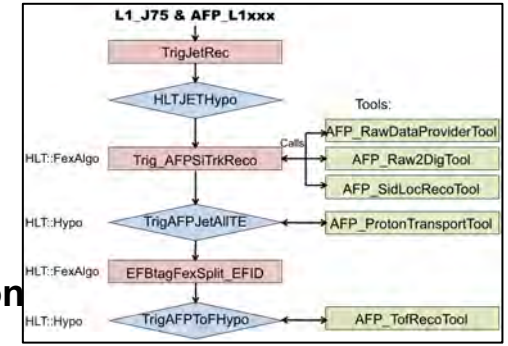
Distributed computing

Iberian Cloud Coordination

TileCal Upgrade HV distribution system



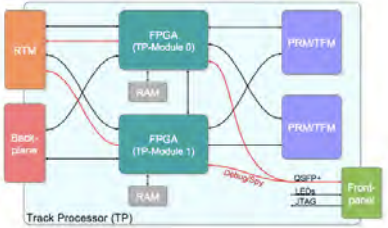
Jets HLT



ATLAS Roman Pot DCS and HLT

Co-leading ARP DCS

Trigger Upgrade: HTT DCS, simulation, mezzanine production



HGTD HV patch panels