

ATLAS-TileCal

“CONTRIBUCIONES AL CALORIMETRO HADRONICO TILECAL Y AL PROGRAMA DE FISICA DEL EXPERIMENTO ATLAS DEL LHC”,

PI1: Luca Fiorini, PI2: Juan Valls,

FPA2015-65652-C4-2-R, 2016-2019

•Physicists

- A. Ferrer (Emeritus, UV)
- E. Higón (Professor, UV)
- V. Castillo (Professor, UV)
- J. A. Valls (Staff, CSIC)
- L. Fiorini (Professor, UV)
- A. Ruiz (RyC, CSIC)
- A. Bailey (S8A postdoc, CSIC)

• Electronic engineers

- A. Valero (Staff, CSIC)
- F. Carrió (Proj. Contract, UV)

• PhD Students

- S. Rodriguez
- F. García
- I. Sayago
- D. Álvarez
(defended May 2018)
- L. Cerdá
(defended Nov 2018)



ATLAS TileCal Operations

ATLAS pp data: April 25-October 24 2018

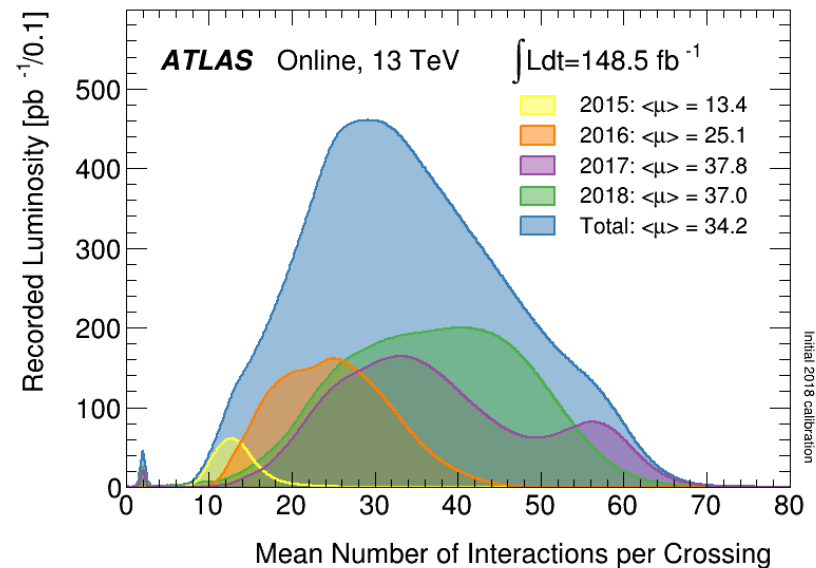
Inner Tracker			Calorimeters		Muon Spectrometer				Magnets	
Pixel	SCT	TRT	LAr	Tile	MDT	RPC	CSC	TGC	Solenoid	Toroid
99.8	99.8	100	99.7	100	99.8	99.7	100	100	100	99.6

Good for physics: 97.5% (60.1 fb^{-1})

Luminosity weighted relative detector uptime and good data quality efficiencies (in %) during stable beam in pp collisions at $\sqrt{s}=13 \text{ TeV}$ between April 25 – October 24 2018, corresponding to a delivered integrated luminosity of 63.8 fb^{-1} and a recorded integrated luminosity of 61.7 fb^{-1} . Dedicated luminosity calibration activities during LHC fills used 0.7% of recorded data and are included in the inefficiency. The luminosity includes 193 pb^{-1} of good data taken at an average pileup of $\mu=2$.

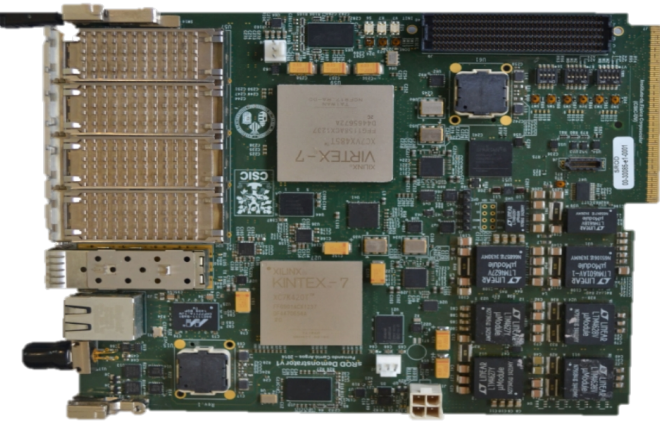
Superb performance of the Tile Calorimeter during 2017 data-taking:

- High Data Quality Efficiency
- Very low dead time
- Coped well with high level of pile-up seen in Run 2 thanks to upgrade of the Digital Signal Processing and Output links of the Read-Out Drivers (our responsibility).



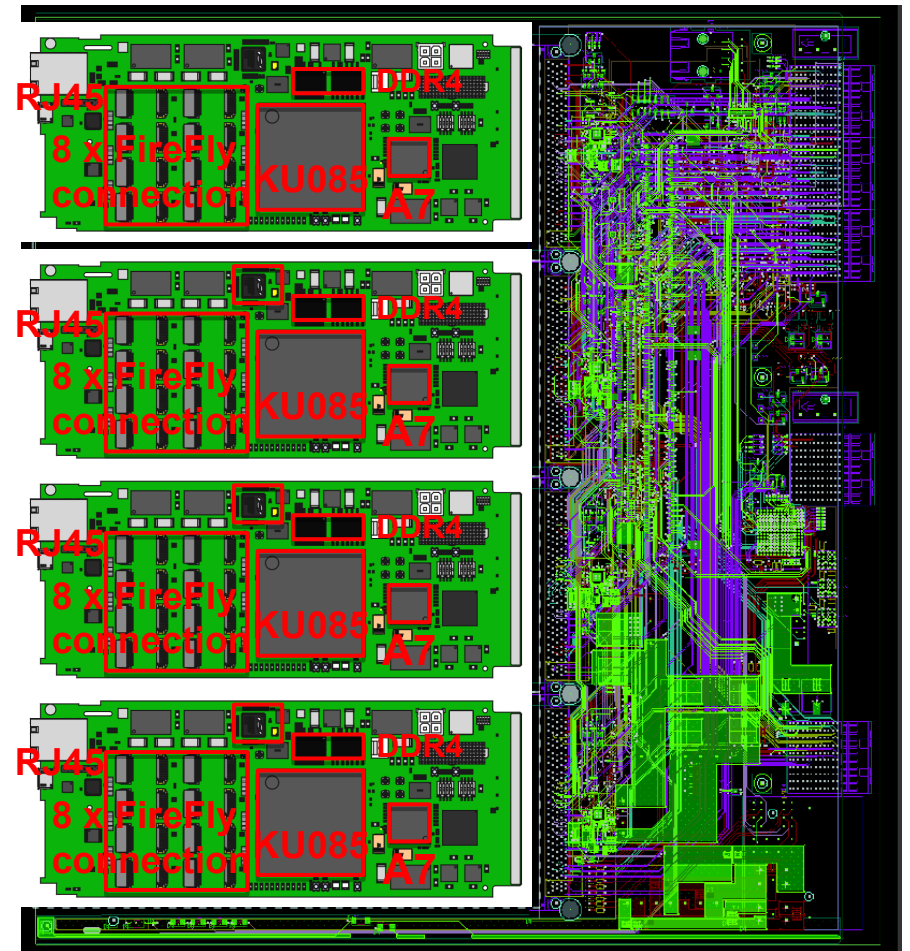
HL-LHC TileCal Upgrade

- We are responsible of the design, firmware and DAQ software of the **TileCal PreProcessor CPM** and **Carrier** boards (back-end electronics).
- **8 TilePPr demonstrator** produced so far: very reliable board, it has been a success.
- Now finalizing design of the final TilePPr, then we'll produce the prototypes in 2019



TilePPr Demonstrator
(present)

1 Tile PPR:
1xCarrier +
4xCPM



TilePPr Prototype (2019)

HL-LHC TDR & Testbeam

- HL-LHC TileCal TDRs released in 2018.
- IFIC personnel among main editors for TileCal.
- **Memorandum of Understanding for the ATLAS HL-LHC upgrade to be signed by the Funding Agencies in early 2019**
- 2 Testbeam for the validation of the new electronics of TileCal have been performed in 2018.
- Tile PPR demonstrators worked fine.



ATLAS

Tile Calorimeter Phase-II Upgrade



Technical Design Report

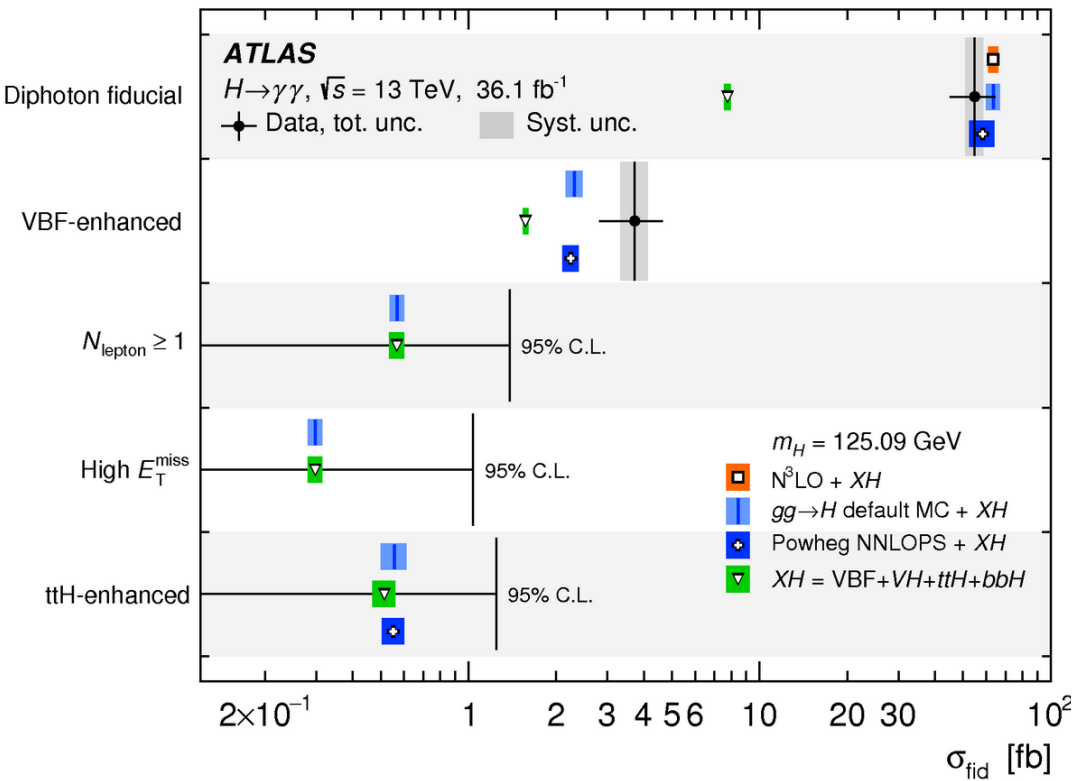


ATLAS Physics Measurements

We contributed to 2 important measurements this years:

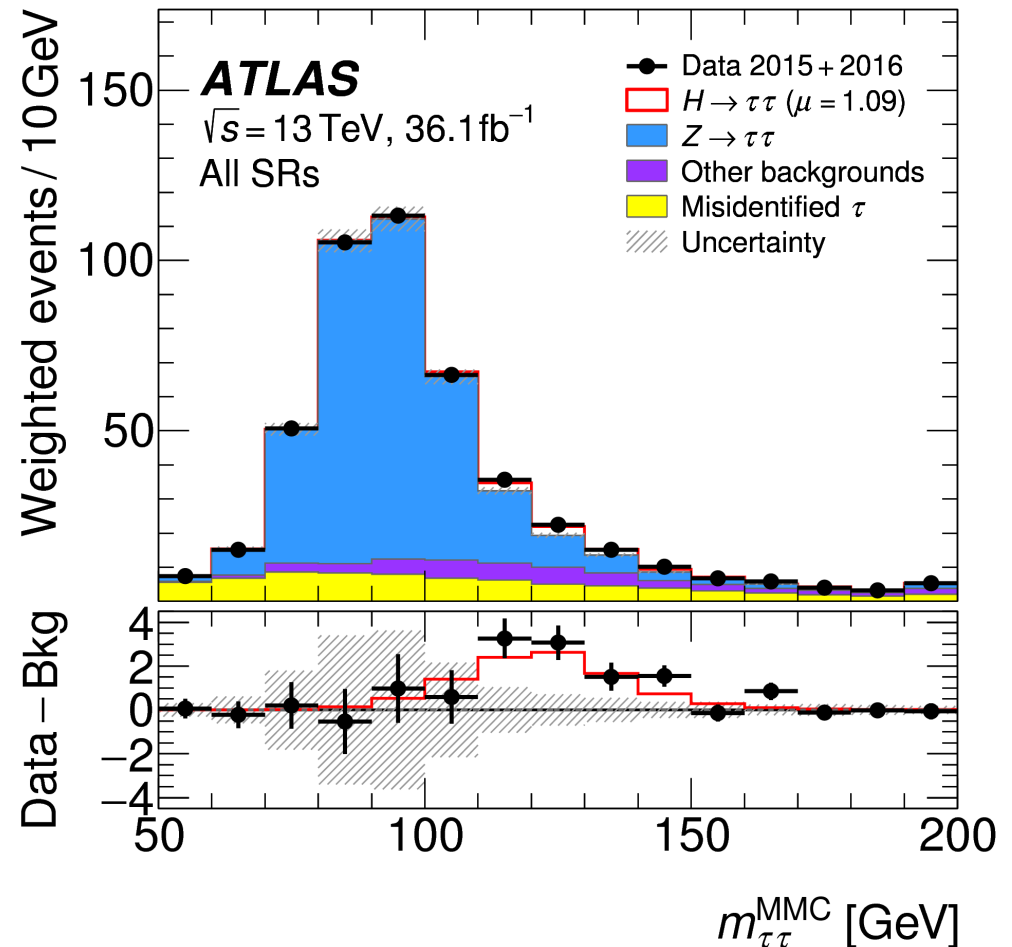
$H \rightarrow \gamma\gamma$: Measurement of the Higgs boson differential and fiducial cross-sections

Phys. Rev. D 98 (2018) 052005



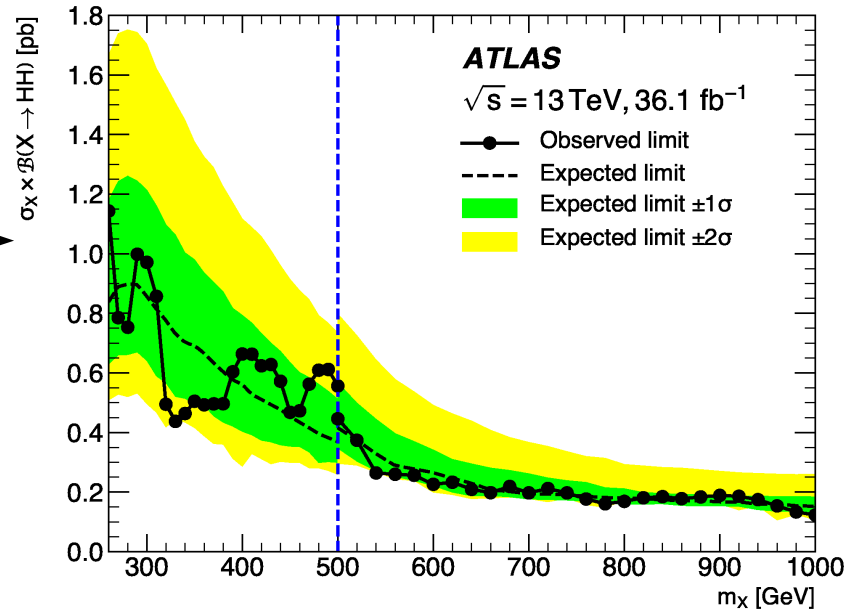
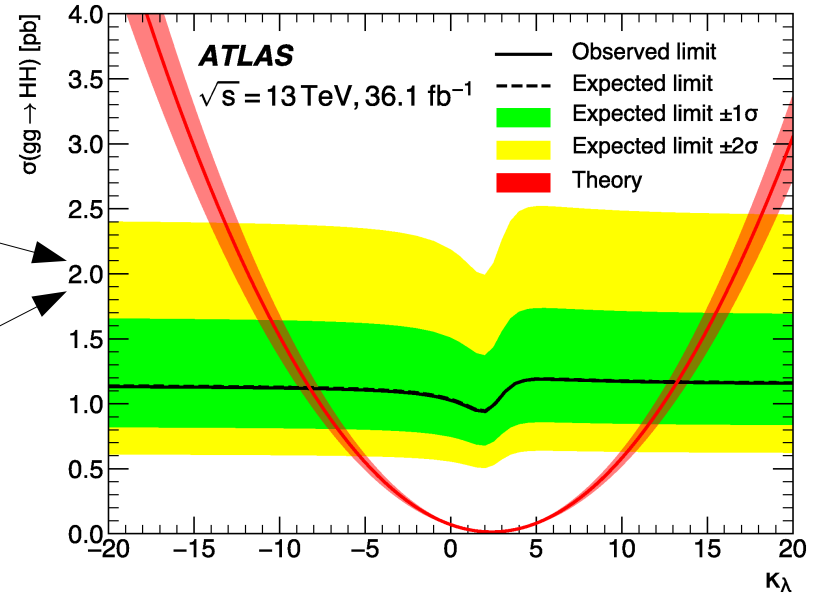
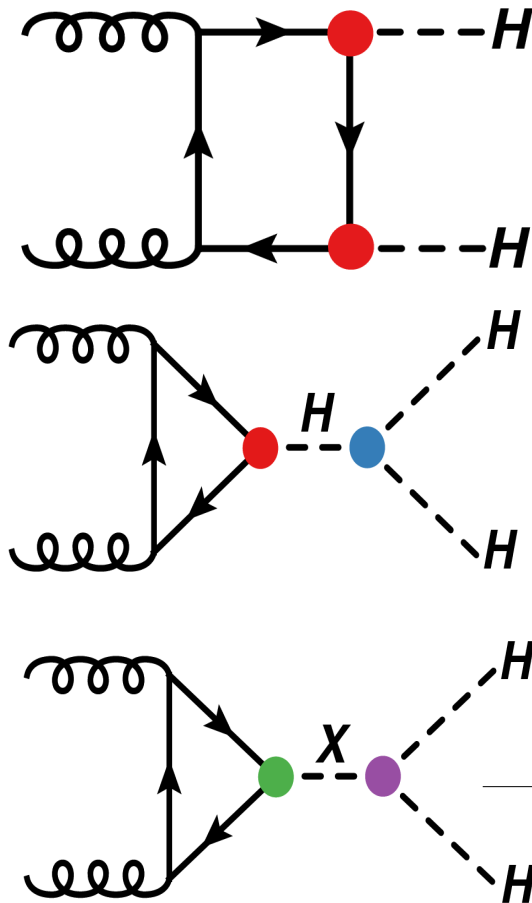
$H \rightarrow \tau\tau$: Measurement of the Higgs boson production modes cross-sections

arXiv:1811.08856



ATLAS Physics Searches

- We contributed to the search of new physics in the HH production mode:
 - $X \rightarrow HH \rightarrow bb\gamma\gamma$ JHEP 11 (2018) 040



- Search for deviation of the HH production cross-section from SM prediction
- Search for resonances decaying to HH

Other Highlights in 2018

SUSY2018 Barcelona, July 23-27, 2018

International Conference on Supersymmetry and Unification of Fundamental Interactions 2018



International Advisory Committee

Local Organising Committee

Pre-SUSY School July 17-20, 2018

susy2018.ifaef.es

QCD@LHC 2018 International Conference

27th - 31st August 2018, Dresden, Germany

Topics:

- Latest results from the LHC: Soft and Hard QCD
- Theory of jets
- Resonance decays
- Higher Order Calculations
- Event Simulation
- Resonance
- Top and Higgs Physics
- QCD in exotic states



International Advisory Board:

Local Organizers:

TECHNISCHE UNIVERSITÄT DRESDEN

ATLAS Responsibilities 2018:

- **A. Valero:** ATLAS TileCal Upgrade Deputy Project Leader
- **L. Fiorini:** ATLAS Tau Working Group convener
- **A. Ruiz:** ATLAS Trigger Menu coordinator
- **L. Fiorini:** ATLAS TileCal speaker committee Chair

SEVENTH INTERNATIONAL WORKSHOP

CH[±]arged 2018

Prospects for Charged Higgs Discovery at Colliders (CHARGED 2018)



21st IEEE Real Time Conference - Colonial Williamsburg

IEEE NPSS NUCLEAR & PLASMA SCIENCES SOCIETY

• 2 PhD Thesis:

- **D. Álvarez,** “Measurement of the Higgs boson coupling with tau leptons and search for an additional neutral MSSM Higgs boson with the ATLAS detector”, Director L. Fiorini.
- **L. Cerdà,** “Measurement of the Higgs boson properties in the diphoton decay channel and a search for di-Higgs production in the ggbb final state with the ATLAS detector”, Directors L. Fiorini & C. Solans.