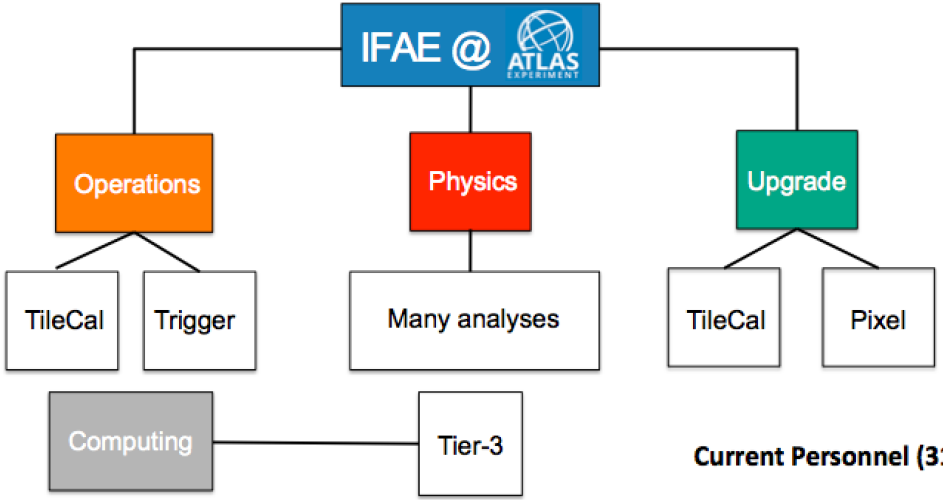
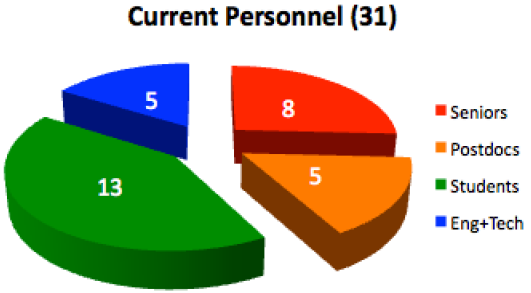
IFAE-ATLAS group overview

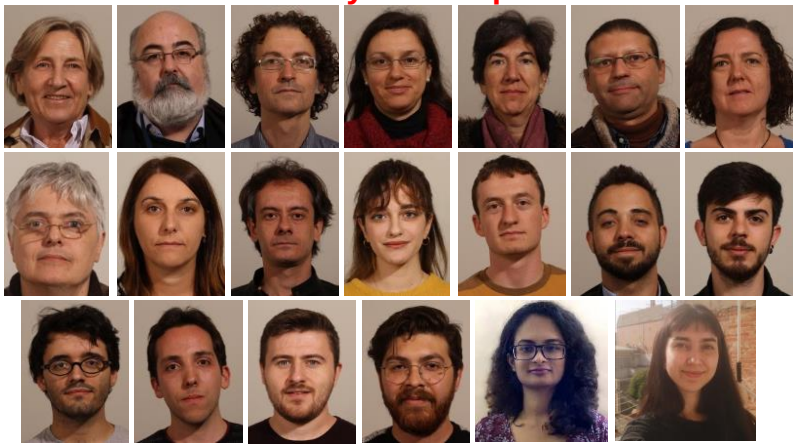
A. Juste for the
IFAE-ATLAS group

- IFAE joined ATLAS in 1992.
- Significant contributions to the detector construction and operation, trigger, algorithms and physics analyses.





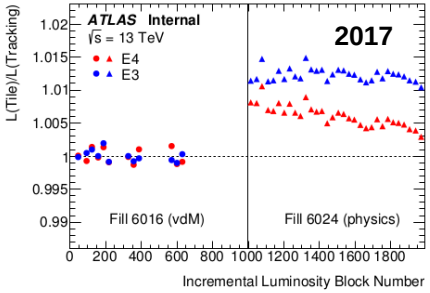
ATLAS Physics & Operations



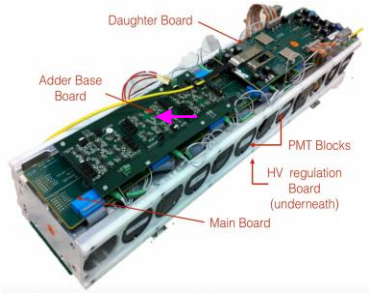
ATLAS Pixels

Operations activities during (LS2 and) Run 3

TileCal



Measurement of the ATLAS luminosity transfer uncertainty



TileCal HL-LHC demonstrator made of prototype HL-LHC upgrade cards

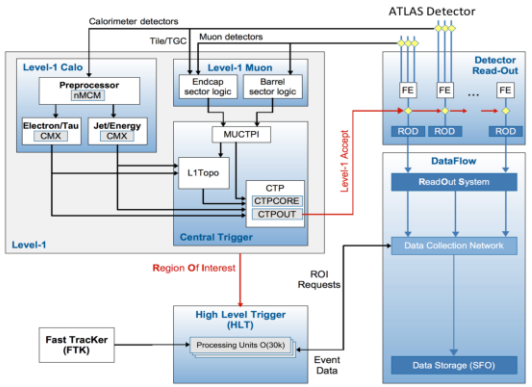
LS2

- Commissioning of newly installed E-counters (Phase-I upgrade).
- Commissioning of the HL-LHC demonstrator installed in ATLAS.
- Finalization of Run 2 studies and related TileCal performance and ATLAS luminosity publications.

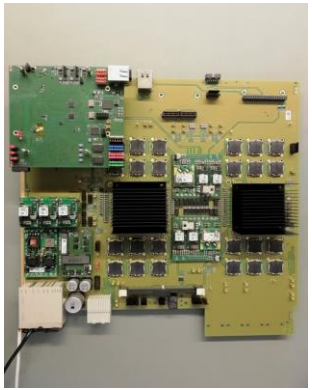
Run 3

- Run coordination and calibrations.
- Optics irradiation and PMT gain non-linearity studies.
- ATLAS luminosity measurement (calibration transfer from vdM scans and long-term stability).
- Test with SPS beams.
- Start development of the Run 4 luminosity measurement methodology with the HL-LHC demonstrator, if kept in ATLAS.

Level-1 Topological Trigger



TDAQ architecture in Run 2



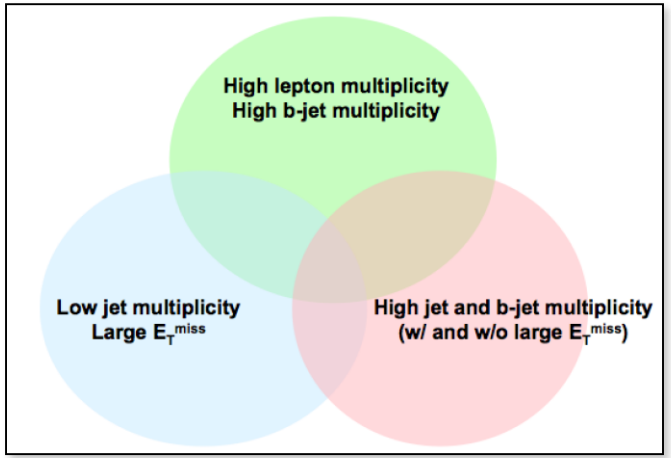
Run 3 L1Topo prototype

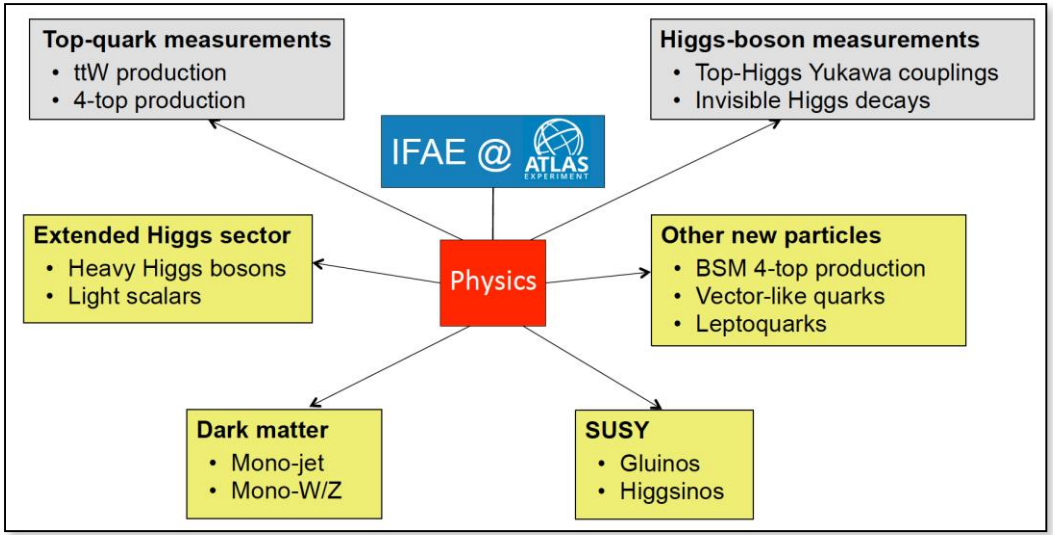
- Preparing the simulation of the Run 3 Level-1 Topological (L1Topo) trigger hardware. Adapting all algorithms to the new software framework.

- Commissioning of new L1Topo hardware, monitoring and maintenance of the simulation of the L1Topo algorithms.
- Commissioning and maintenance of the HLT tau-trigger tracking algorithm developed during LS2.
- Trigger operation activities (incl. control room/trigger expert on-call shifts, trigger release coord. /software validation shifts).

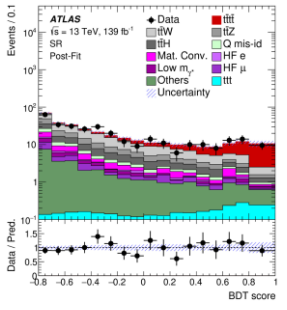
Physics analysis activities during (LS2 and) Run 3

- Focus on a number of multipurpose final states sensitive to many BSM models.

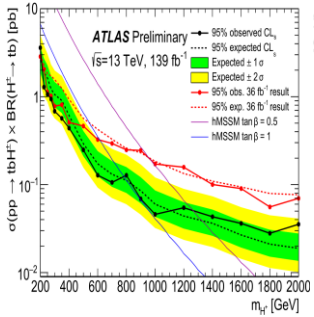




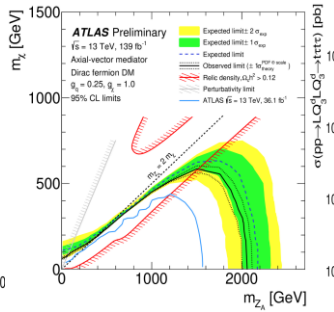
- During LS2 working on full Run 2 publications (expect ~20).
- Much of the current physics program will remain compelling in Run 3.
- However, our program is dynamic and continuously evolving to capitalize on new exciting opportunities.



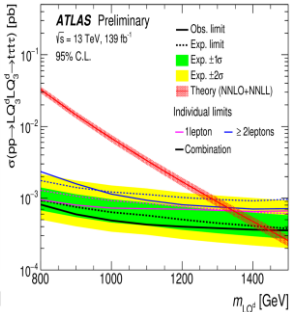
4-top evidence



tbH$^{\pm}$(→tb)



Mono-jet

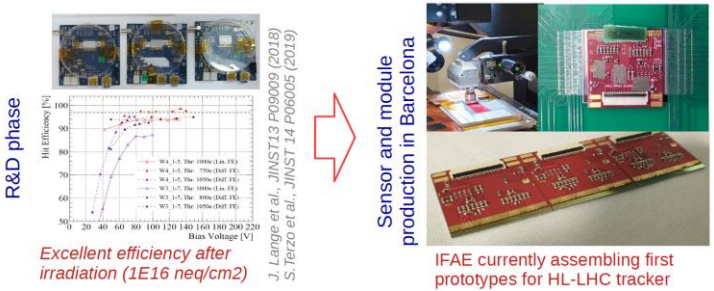


3rd gen. LQ

Upgrade activities towards HL-LHC

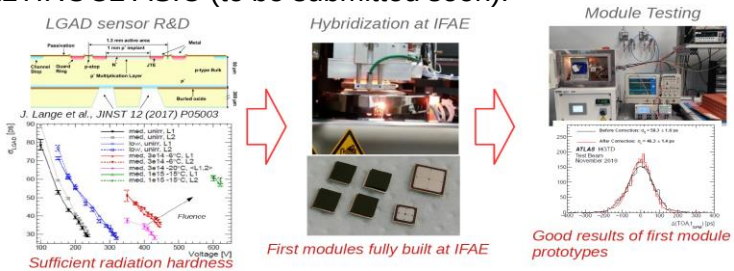
Inner Tracker (ITk) Pixels

- Building on success of previous projects that developed first 3D sensors for HEP (IBL in ATLAS), aim to fabricate sensors (30-50% of total) at CNM and assemble modules at IFAE for innermost ITk layer.
  - Developed new generation of 3D sensors (smaller pixels, thinner).
  - Pre-production of sensors on-going at CNM.
  - First module prototypes being built at IFAE.



High-Granularity Timing Detector (HGTD)

- Proposed Low Gain Avalanche Detector (LGAD) technology (developed at CNM) for HGTD to mitigate impact of pileup.
- Aim to fabricate sensors (10-25% of total) at CNM and assemble modules at IFAE:
  - HGTD TDR approved by ATLAS/LHC in September 2020.
  - R&D phase ~completed, pre-production scheduled for 2022.
  - Also playing a major role in the design of the digital part of the ALTIROC2 ASIC (to be submitted soon).



TileCal

- Aim to fabricate housing of new TileCal front-end electronics (104 super-drawers, 40% of the total).
  - Conceptual design and proto-typing by IFAE.
  - Pre-production (12 mini-drawers) completed at IFAE in 2020.
  - Component integration tests, including SPS tests.
  - Supervision of the FE design related to the luminosity measurement.