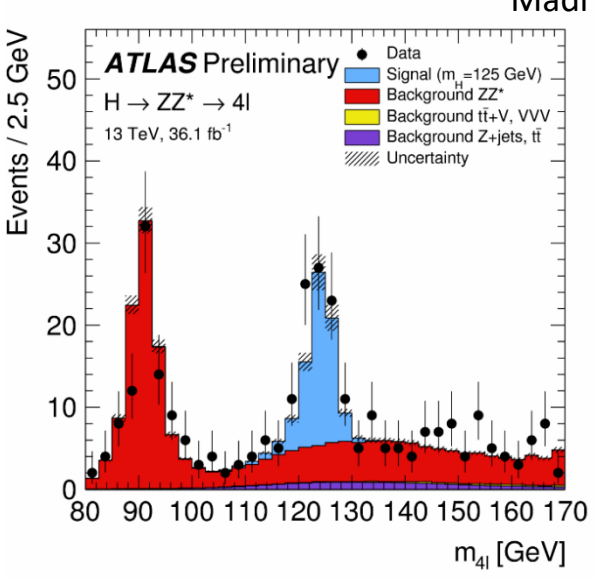
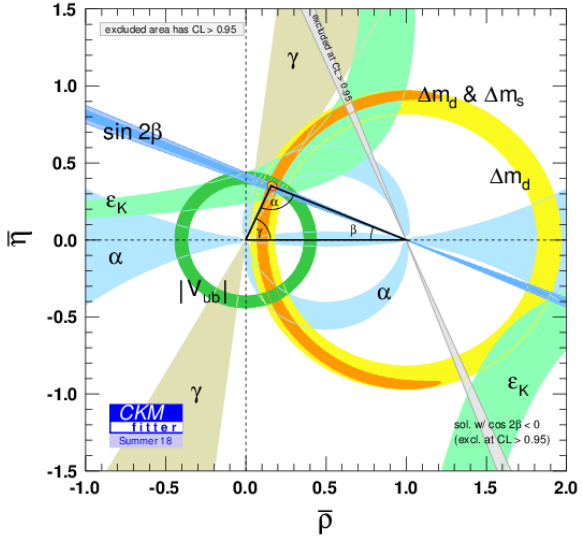
# Position for the European Strategy

LHC network, Flavor network (REFIS)

Madrid, 21.9.2019




[Link to the document]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# Position for the European Strategy

LHC network, Flavor network (REFIS)

- First priority on LHC (ATLAS, CMS and LHCb), present and for the HL-LHC era:

  → **Full data exploitation (Run2 + Run3 and beyond)**
  → **Participation in the Upgrade detectors**

  → Contribution to Flavour Physics
  → Computing activities
  → Theory development in HEP
  → R&D (HL-LHC and future colliders)

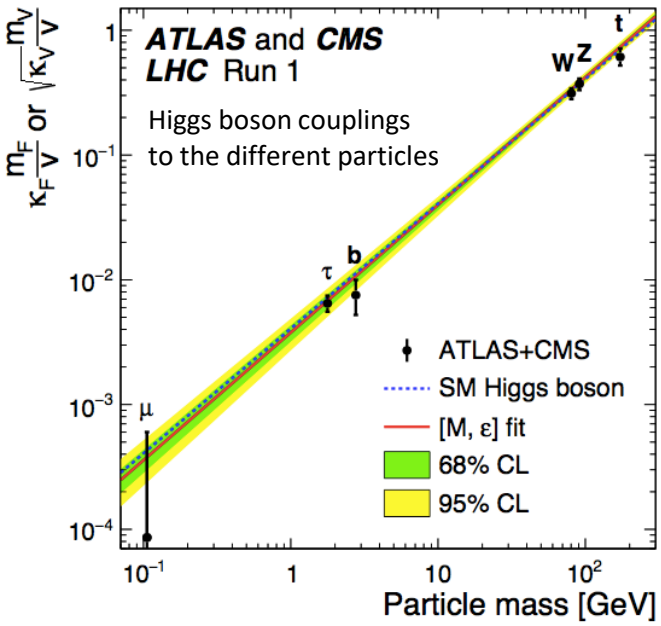
(aligned with the Spanish membership of CERN)

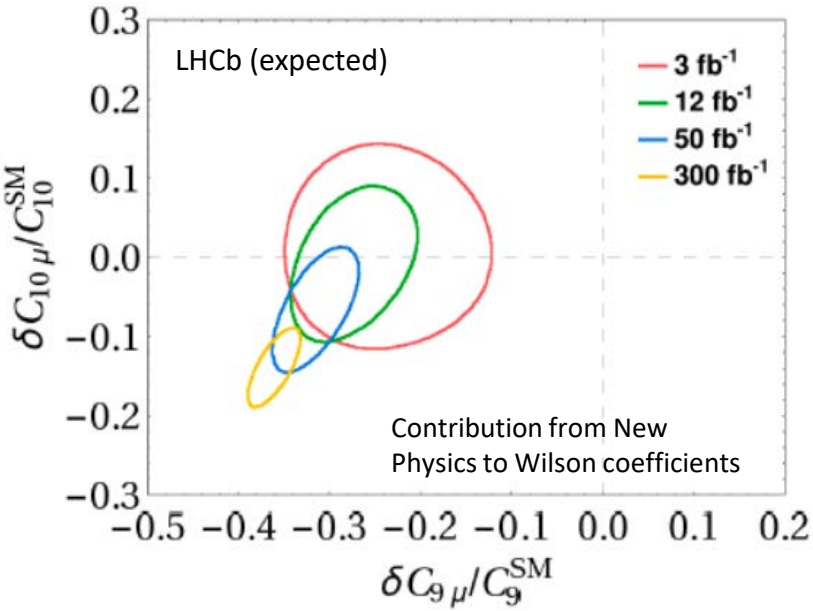
# Position for the European Strategy

LHC network, Flavor network (REFIS)

LHC: Full data exploitation

Highest priority in the European Strategy for Particle Physics

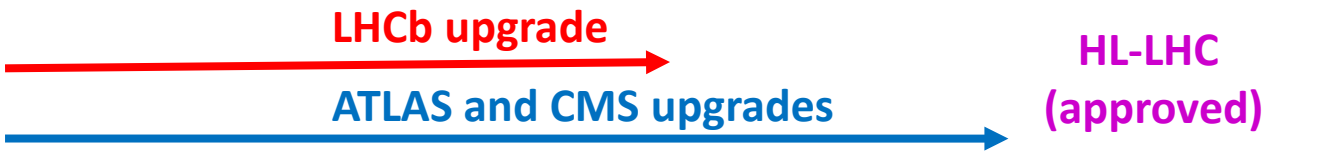



Precise measurements of the Higgs boson properties, SM parameters, the flavour sector and direct searches for new phenomena.
Exploiting correlations (multi -observables analysis).

# Position for the European Strategy

LHC Upgrades: Main path in the European Strategy for Particle Physics




| Run (years) | Run1 (2010-2012) | Run2 (2015-2018) | Run3 ✶ (2021-2023) | Run4 (2027-2029) |
|---|---|---|---|---|
| Integrated Luminosity | ATLAS, CMS: **30** | ATLAS, CMS: **120** | ATLAS, CMS: **300** | ATLAS, CMS: **3000** |
| ($fb^{-1}$) | LHCb: **3** | LHCb: **8** | LHCb: **25** | LHCb: **50** |
| Instantaneous Luminosity | ATLAS, CMS: **$1x10^{34}$** | ATLAS, CMS: **$2x10^{34}$** | ATLAS, CMS: **$2x10^{34}$** | ATLAS, CMS: **$5x10^{34}$** |
| ($cm^{-2}s^{-1}$) | LHCb: **$4x10^{32}$** | LHCb: **$4x10^{32}$** | LHCb: **$2x10^{33}$** | LHCb: **$2x10^{33}$** |

Tracking detectors, electronics for muons and calo, trigger and data adquisition systems

LS2 and LS3: installation of upgraded detectors



✶ 14 TeV

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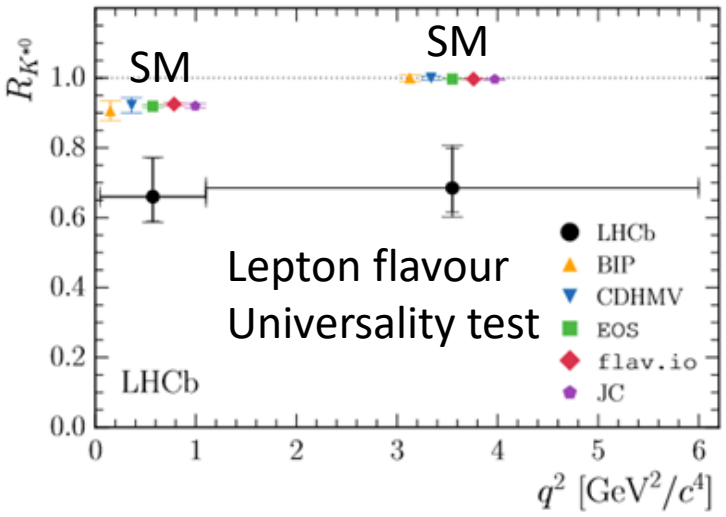
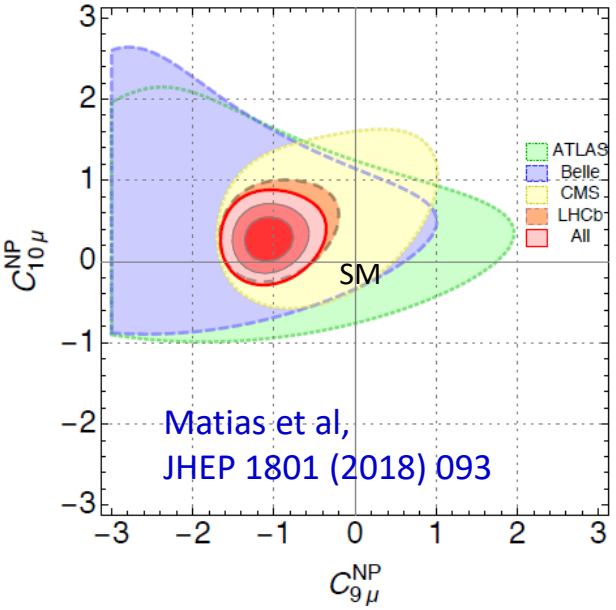
Flavour Physics




New Physics hypothesis preferred over SM by more than 4 - 5σ




Belle – II starting to taking data.

LHCb analyzing Run2 data and preparing for the upgrade.

The Spanish B-Physics (experimental) community prioritizes the participation in LHCb

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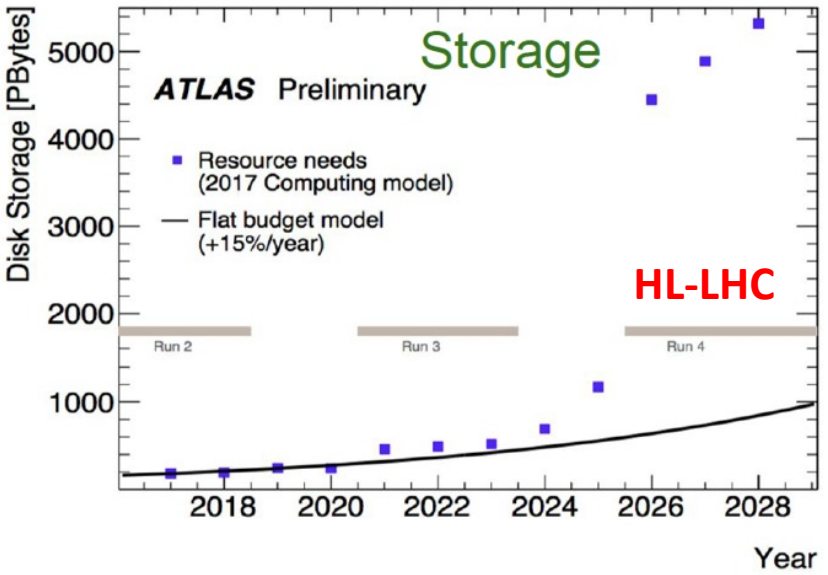
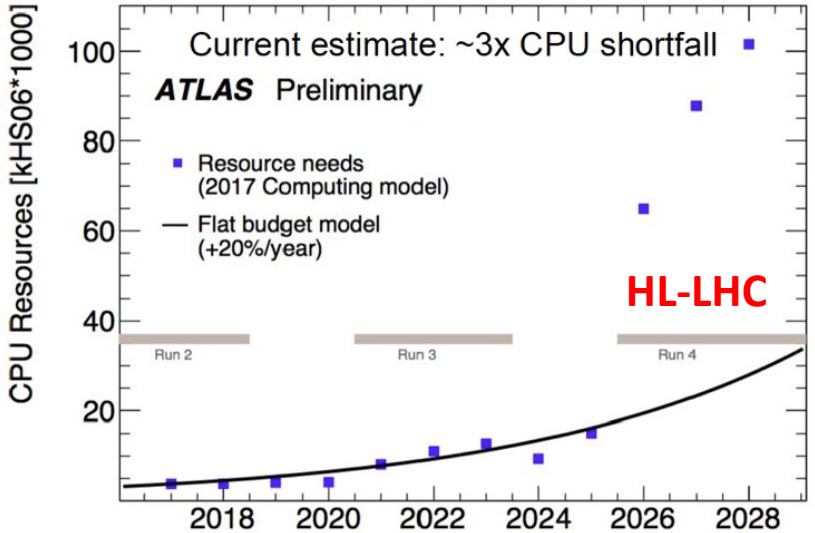
Computing challenges

Disk storage ~6x short at HL-LHC




Improvement of ATLAS, CMS and LHCb Tier-1 and Tier2 infrastructures for HL-LHC

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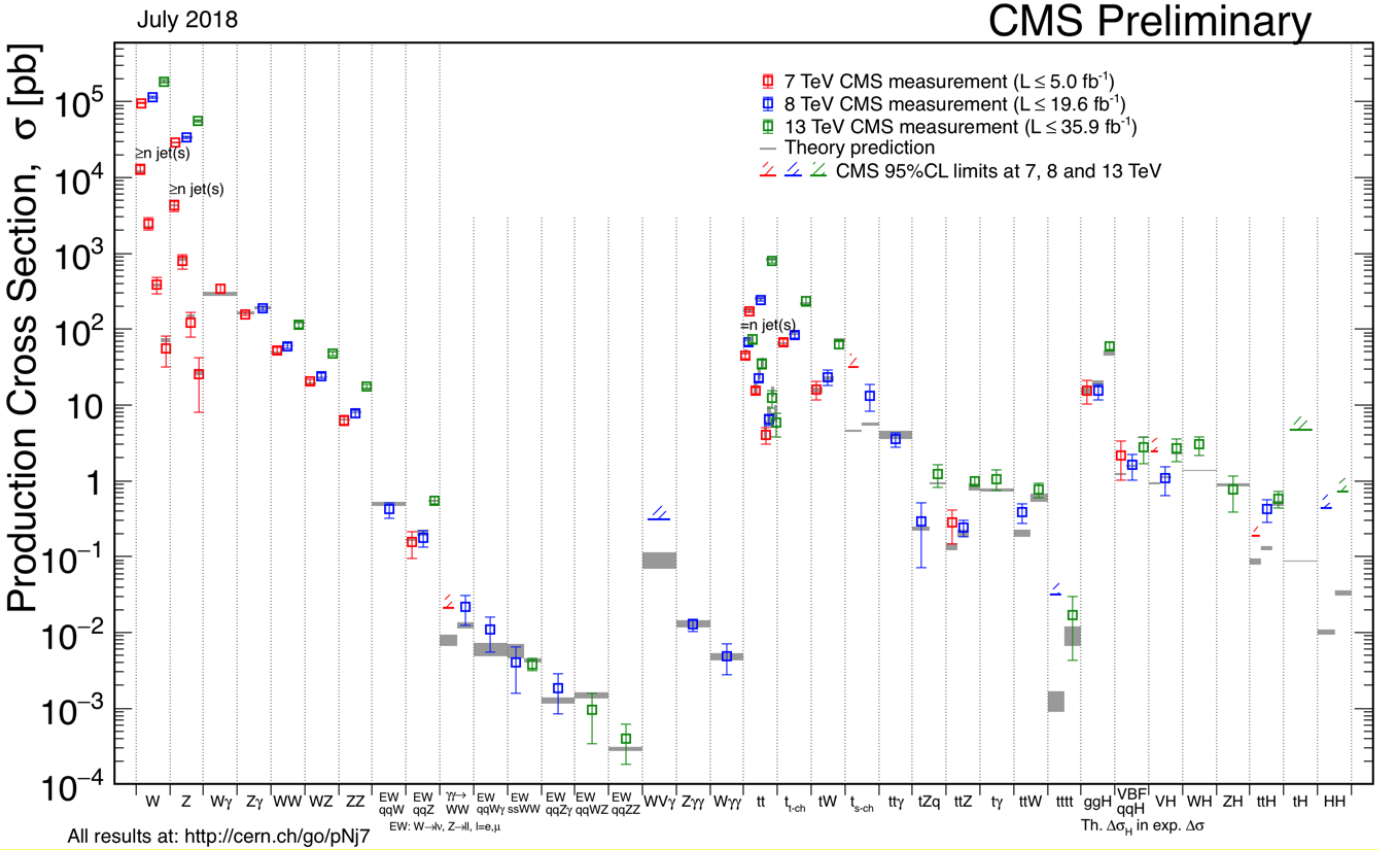
Theory development




SM processes (Higgs, top), BSM (SUSY, new gauge bosons, vector-like fermions), Flavour phenomenology (heavy quarks and leptons) and Heavy ion physics.

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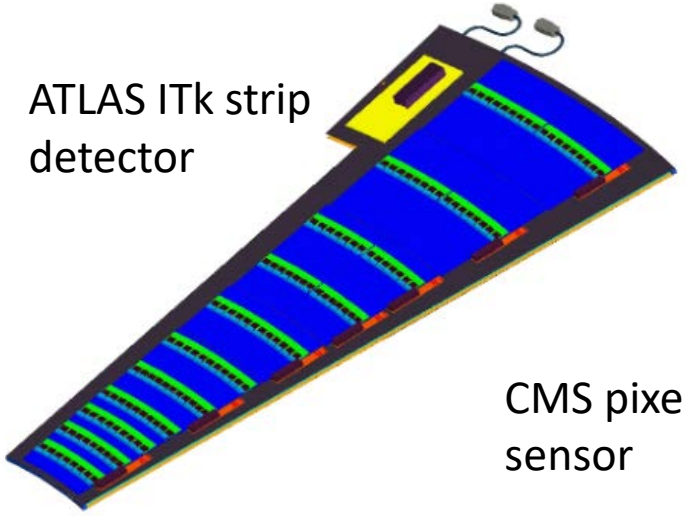
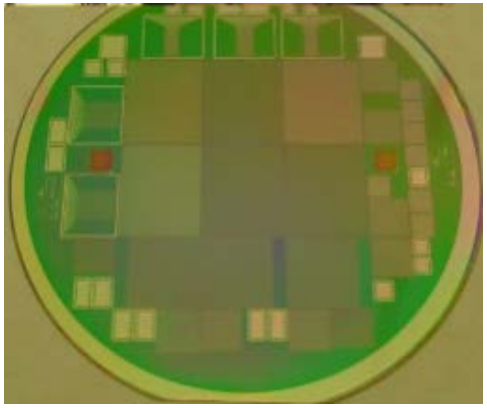
R&D and future colliders

Extensive R&D program for HL-LHC as priority (new tracking devices and highly segmented calorimeters, improved and compact electronics)

ATLAS ITk strip detector



CMS pixel sensor




LHCb tracker electronics

Beyond HL-LHC: support ongoing R&D efforts for high energy pp colliders (HE-LHC, FCC-hh) and $e^+e^-$ machines (ILC, CLIC, FCC-ee, CepC)