# The CMS Tracker Endcap Pixel Detector Upgrade for the High-Luminosity LHC

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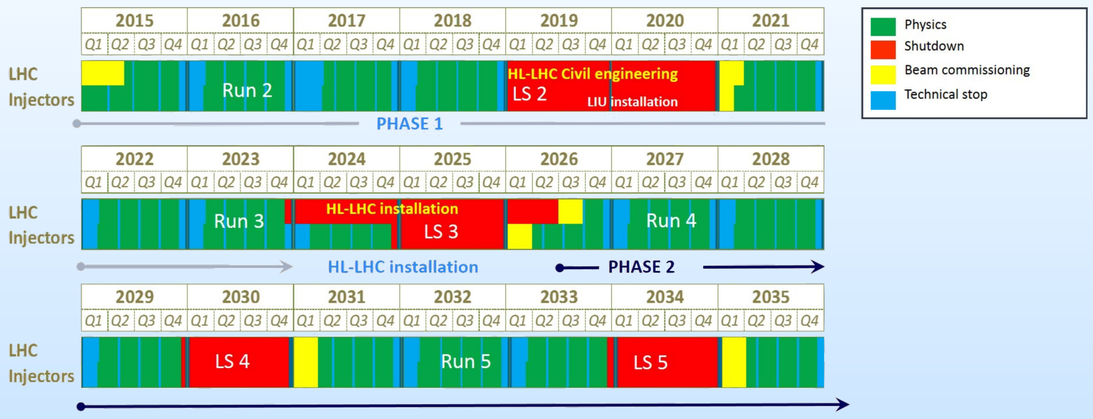
November 2018

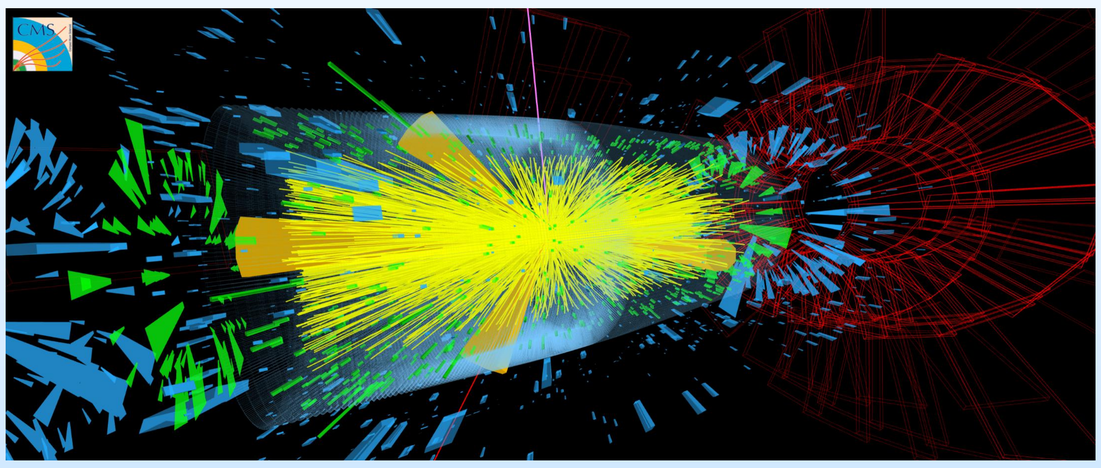
## LHC Upgrade Plan

- CERN Accelerator complex will be upgraded during the Long Shutdown 3
- instantaneous luminosity to increase to $5 - 7.5 \times 10^{34}\,\mathrm{cm}^{-2}\mathrm{s}^{-1}$
- $3000\,\mathrm{fb}^{-1}$ of integrated luminosity




## Inner Tracker Upgrade

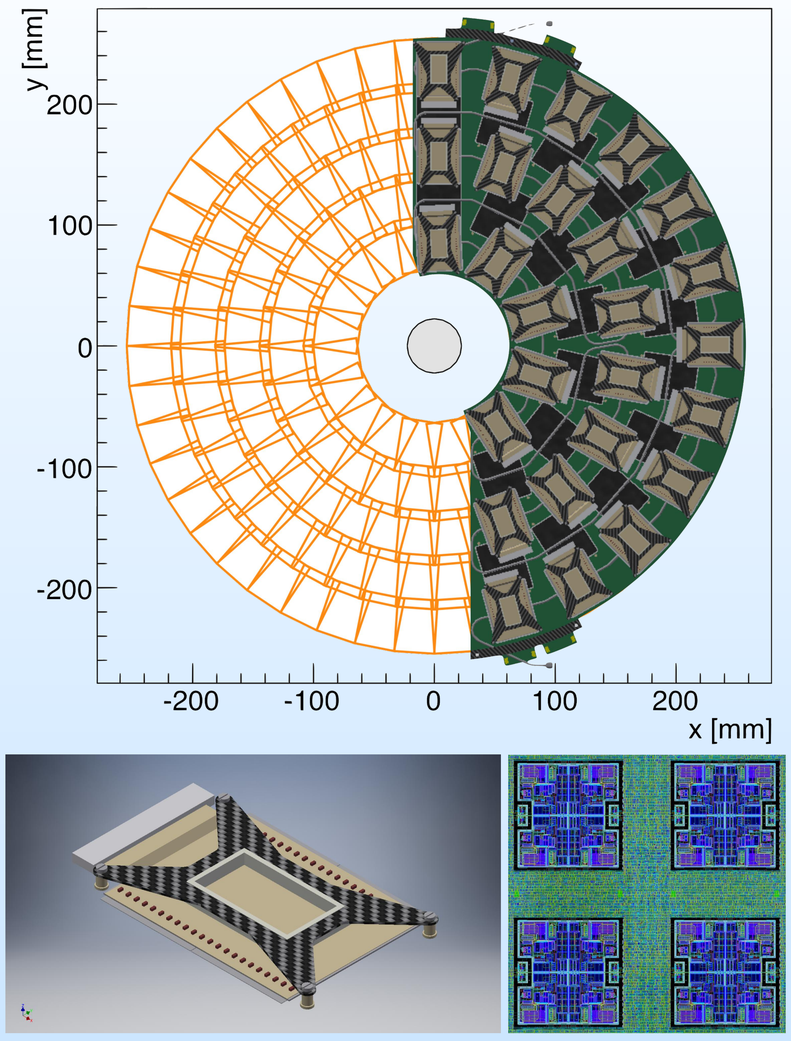
- Increased radiation resistance
- Increased channel granularity to maintain a high reconstruction efficiency at the increased pile-up conditions (200 pile-up)
- Reduced material budget and extended tracking acceptance
- Improved two-track separation to resolve tracks in high-$p_\mathrm{T}$ jets



**University of Zurich will build the Endcaps of the Inner Tracker**

## EPix Geometry Design and Prototypes

- Design phase ends soon
- Mechanical prototypes will start being built soon








## Contact

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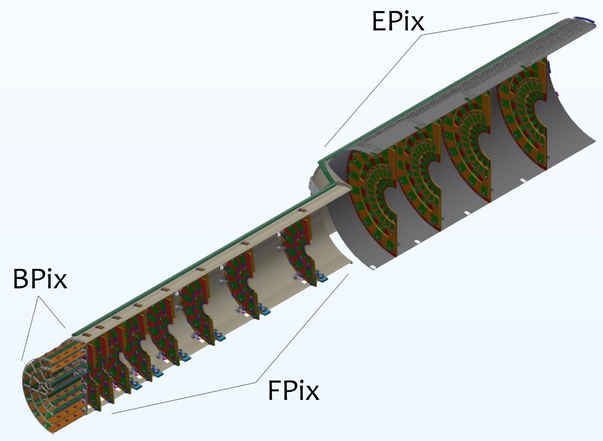
## Physics Motivation

- Standard Model Higgs boson Yukawa couplings
- Discovery potential for many beyond the Stantard Model physics (Supersymmetry, extra dimensions and extra gauge bosons) reaching higher masses
- New channels with low production cross sections of small coupling strengths

## Inner Tracker Geometry

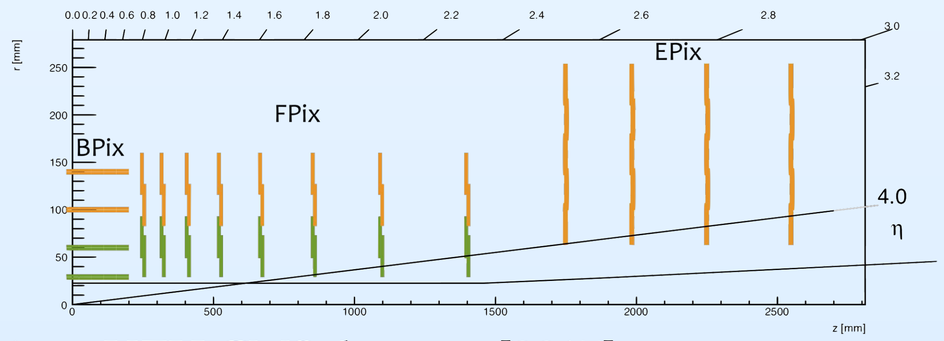
### Inner Tracker

- Detector is divided in three main components covering different pseudo-rapidity regions
  - BPix - FPix - EPix
- It is composed from more than $2 \times 10^9$ pixels, corresponding to an area of about $5\,\mathrm{m}^2$



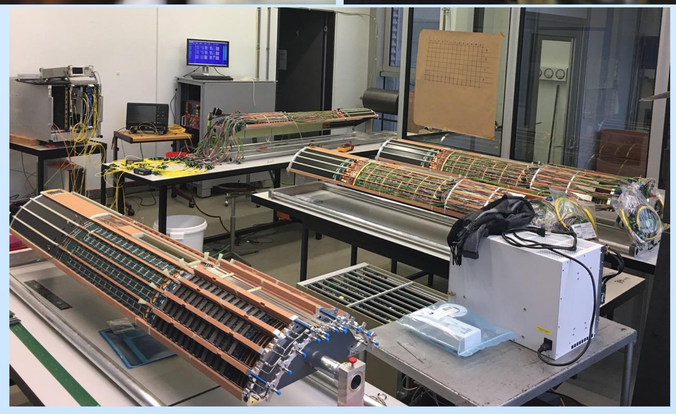

### EPix

- Largest system in inner tracker
  - 4 disks per end
  - 2 dee per disk
  - 88 modules per dee
- Extends coverage up to $|\eta| \approx 4$
- Provide luminosity measurement




### Previous UZH CMS detector [2017]

BPix Phase-1 Upgrade



## Expected Performance

- Improved $p_\mathrm{T}$ and impact parameter resolution as a function of $\eta$