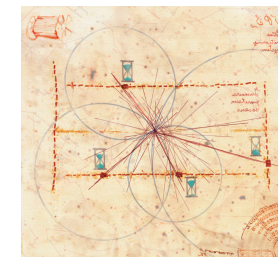
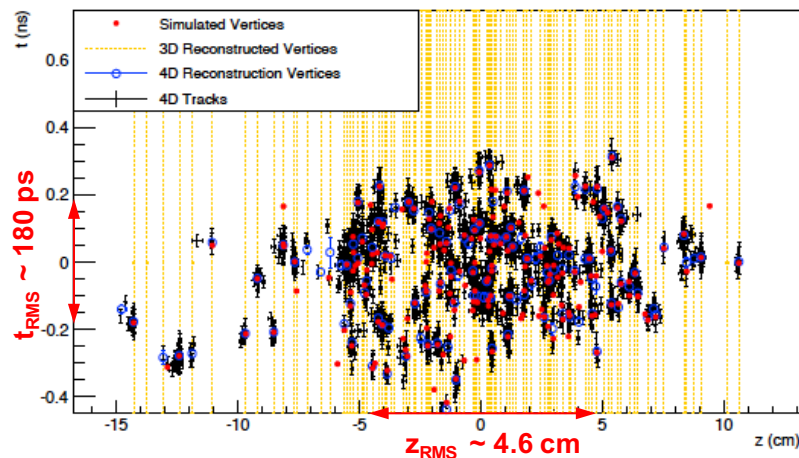


# Present status and future perspectives of the Endcap Timing Layer for the CMS MTD

V. Sola on behalf of the CMS Collaboration



200 pp vertices



**Conditions at HL-LHC very challenging**  
→ at the edge of tracker performances

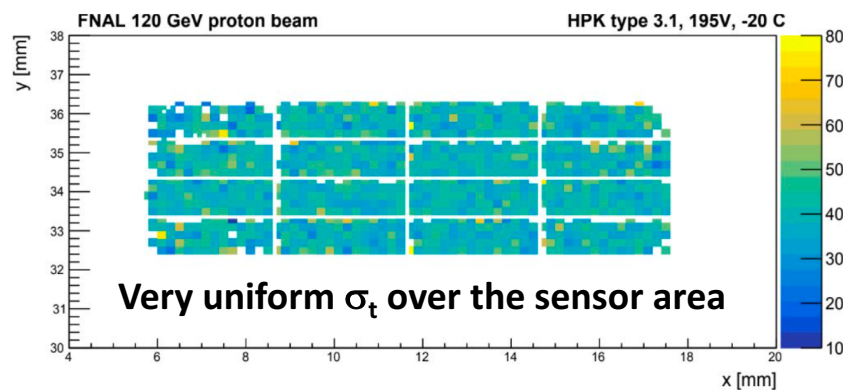
⇒ Assigning time information with timing resolution of 35 ps will reduce vertex merging from 15% in space to 1% in space-time, as in LHC operation

**The Endcap Timing Layer (ETL) is a vertex detector in time domain at 3 m from the interaction point**

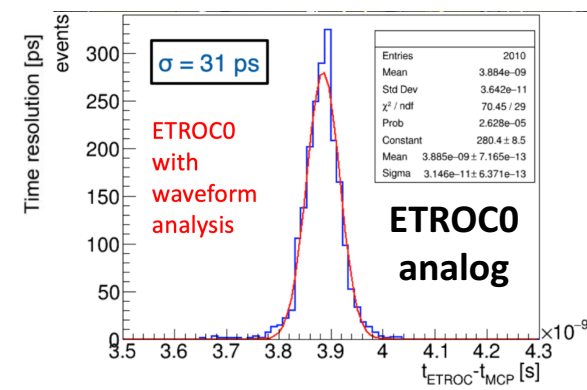
→ **Expected start of operation in 2029**

## Sensors for ETL

Low-Gain Avalanche Diodes (LGADs) with  $\sigma_t \sim 30$  ps degrading to 40 ps at  $1.5 \cdot 10^{15} n_{eq}/cm^2$



**Very uniform  $\sigma_t$  over the sensor area**



## Endcap Timing ReadOut Chip (ETROC)

- ▷ Extract precision timing from small LGAD signal ( $\sim 5fC$  at end-of-life)
- ▷ Low power budget of 1W/chip,  $\sim 3$  mW/channel → low power TDC
- ▷ ASIC contribution to time resolution < 40ps

→ **The Endcap Timing Layer is expected to provide a timing resolution per track < 40 ps up to the end-of-lifetime in most of its volume**