

# Feedback from 2024 and 2025 Desiderata

Loris Martinazzoli<sup>1</sup>  
on behalf of the LHCb Collaboration

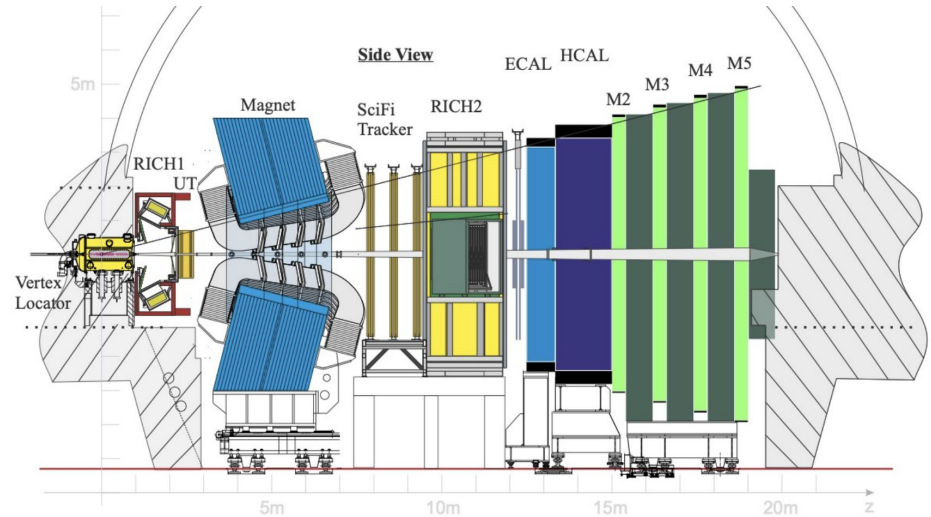


<sup>1</sup> CERN, Geneva, Switzerland

# LHCb Testbeams in 2024

All the **LHCb sub-detectors collaborating** towards the Upgrade II of the experiment.

- Vertex Locator (VELO)
  - Development of the TimePix 4 chip
  - Development of 3D Si sensor
- RICH
  - R&D on new electronics (FastRICH) and photomultipliers with <100 ps timing
- SciFi
  - New FBK SiPMs w/ and w/o uLenses
  - New fibres mat designs
- Calo
  - Design of new calo modules radiation hard and with ~10 ps timing
- Muons
  - New gas detectors ( $\mu$ RWell) + electronics



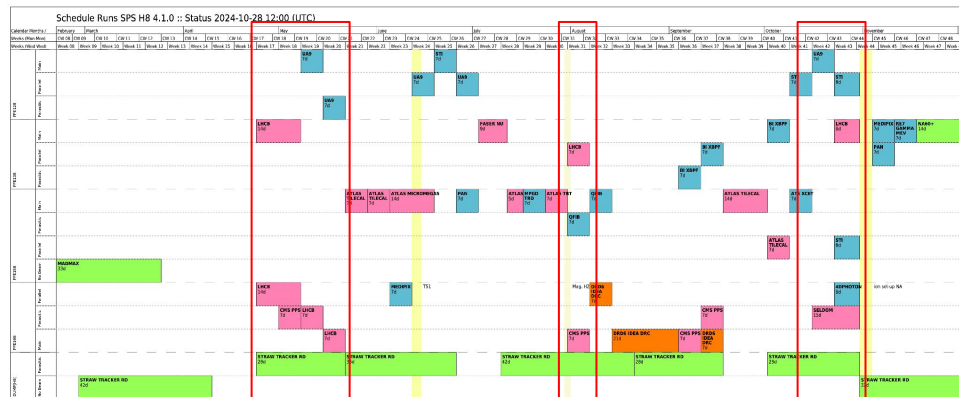
**Groups sharing goals, but also infrastructure!**  
(common time reference, clock units, DAQs)

**Note:** effort to move towards common runs with multiple subdetectors (e.g. VELO+RICH)

# Feedback from 2024 - H8

Overall **positive experience** with parallel users

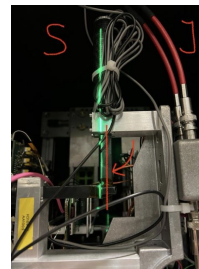
- Positive experience also within LHCb:
  - sharing equipment  
⇒ better efficiency
  - sharing infrastructure  
⇒ less material budget  
Better for the parallel users!
- Only **one major conflict** with parallel users:
  - UA9/STI needed parallel beam with rate  $\sim 3e5/\text{spill}$
  - LHCb needed focused beam with rate  $> 1e6/\text{spill}$



$\Leftarrow$  rate /  $\text{cm}^2$  too low for effective LHCb data taking  
 $\Leftarrow$  configuration not usable by UA9/STI

**⇒ When UA9/STI takes data, LHCb cannot and vice versa**

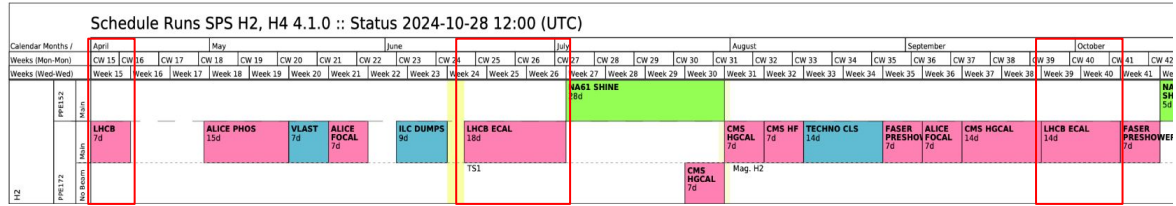
- Positive and collaborative approach from UA9/STI to save the testbeam, thank you!
  - Clear incompatibility, to be avoided whenever possible in future.
- Beam in April/May horizontally off the nominal centre by 9 mm



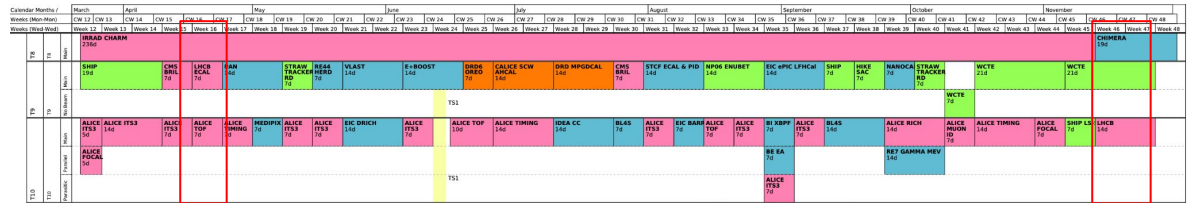
# Feedback from 2024 - H2 & PS

## Positive experience

- Successful test of the SciFi electronics (1st slot)
- Very productive and successful beamtimes for the LHCb ECAL
  - **The extension of the SPS proton physics was very beneficial**



- LHCb testbeam in PS starts tomorrow



- First time in PS with the MUONs set-up ⇒ Thanks to the Beam expert and the crew for the support!

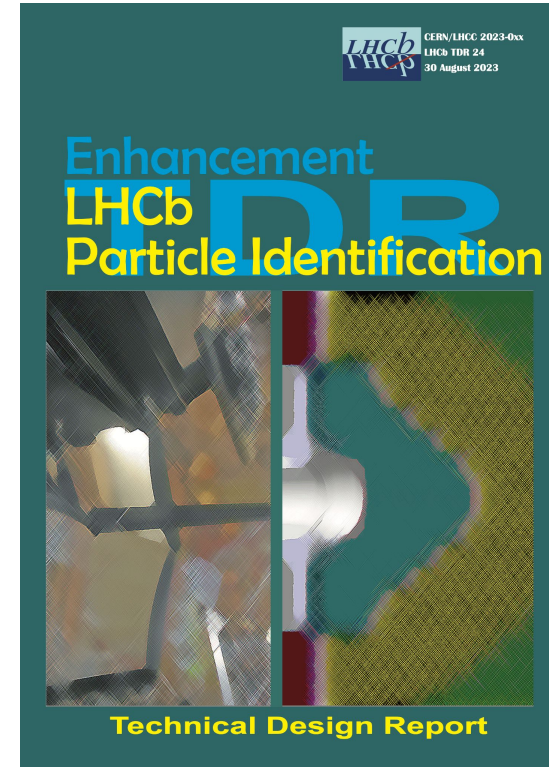
# Milestones for 2025

R&D of 2024 allowed to prepare the **LHCb Upgrade II Scoping** document

**Crucial milestones** in the next years:

1. Final preparations towards the **LS3 Enhancement**  
LHCb CALO + RICH produced the **TDR for the PID enhancement**
2. **LHCb Upgrade II TDR** due in early 2026!  
Testbeams of 2025 crucial for all subdetectors

**All subdetectors** are in **critical moments** of the R&D towards UII



# Outlook for 2025 - North Area

Requests for 2025 are similar to 2024

## H8 — Main/Parallel: 4 slots

- 2 weeks in **April/May** (PPE138 + PPE168)
- 2 weeks in **June** (PPE138)
- 1 week slot **in summer** (PPE138)
- 2 weeks **as late as possible** (PPE138 + PPE168)

We cooperate efficiently with many other users.

Glad to continue with anyone matching **beam requirements:**

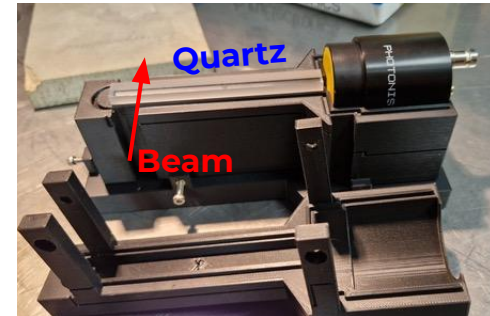
- mixed hadrons 180 GeV/c — Rate > 1e6 / spill — FWHM ~ 5 cm (PPE138)

New time reference based on quartz bars should further **reduce material budget**

## H2 — Main: 3 slots

- 1 week in **April/June**
- 2 weeks in **May/June**
- 2 weeks in **Sep/Oct**

*Possible interest in 40 MHz beam structure. Still available?*



# Outlook for 2025 - East Area

Some notable differences!

## **LHCb TORCH — T9**

- 4 weeks starting **Mid July**
  - Similar conditions to 2022
  - Required to cope with the long installation times (e.g. might be necessary removing floor)
  - Only T9 is long enough

## **T9/T10 — LHCb**

- Longer proton physics time will help with preparations and measurements for the scoping documents

# Infrastructure Desiderata

Happy with the infrastructure so far. Some suggestions:

- Gas bottles monitor — Any way for the users to check the gas levels?
- Hut HNA 443
  - Appreciated the improvements in 2024
  - A couple of useful things:
    - shelves
    - coat hanger





# Backup

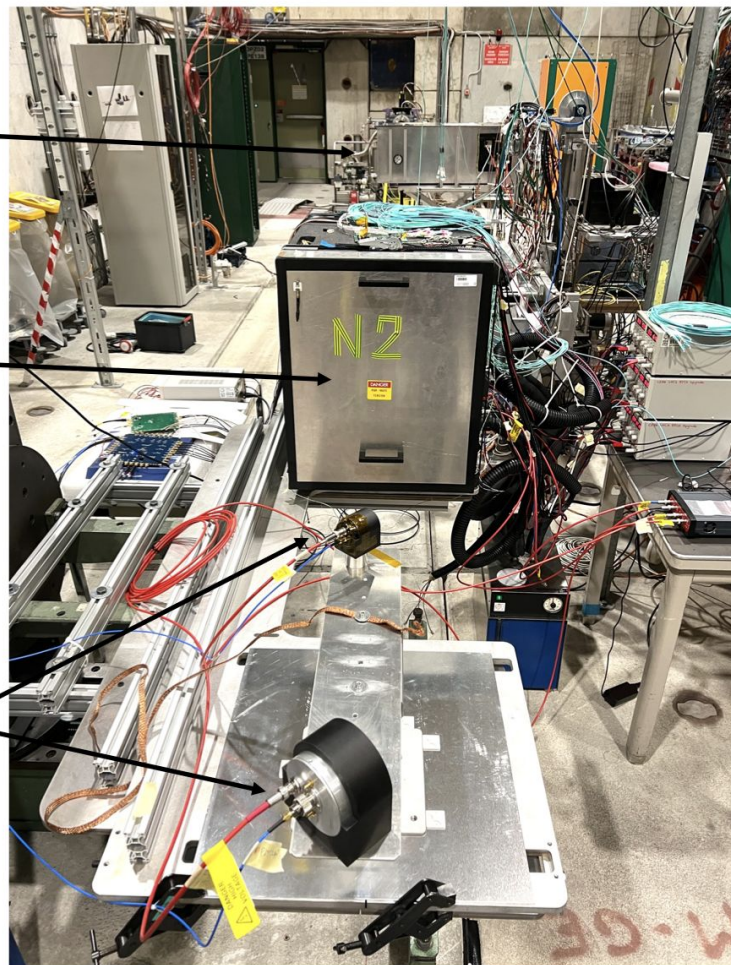
# MCP-PMT reference time system

Aerogel / LAPPD box.

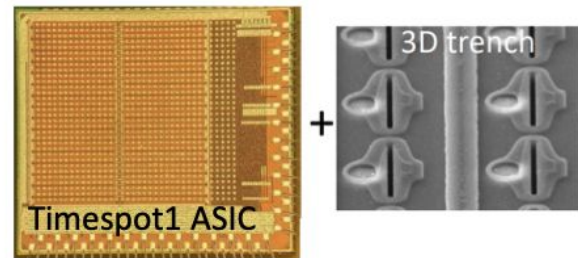
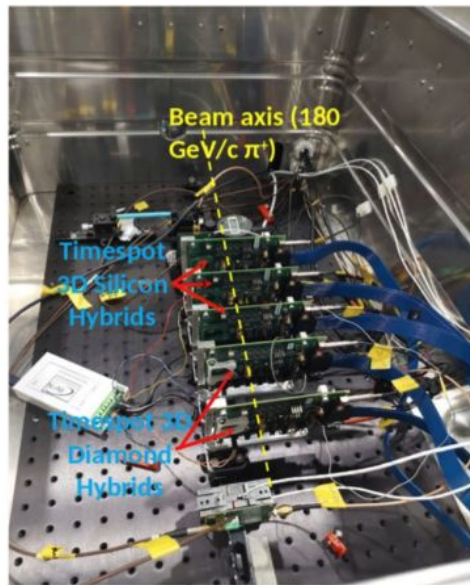
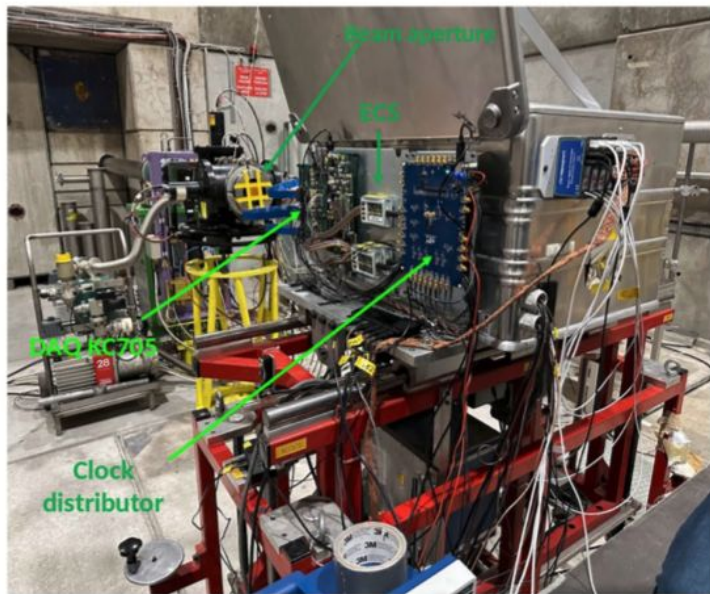
Lens and MAPMT box ("Kangabox").

Time reference system, on same base plate as the Kangabox, together mounted on the DESY translation table.

- MCP-PMT system presented by David today.
- Many thanks to our Oxford/TimePix4 colleagues for operating the system.



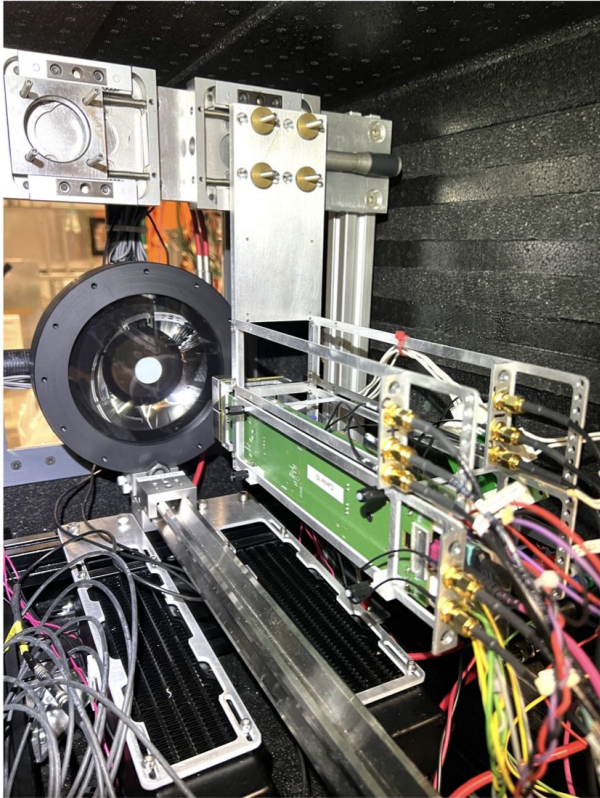
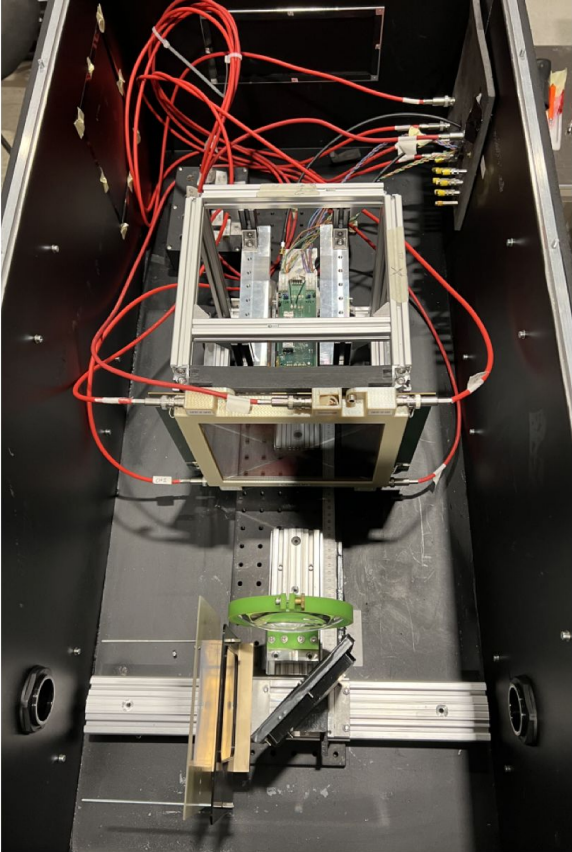
# Timespot



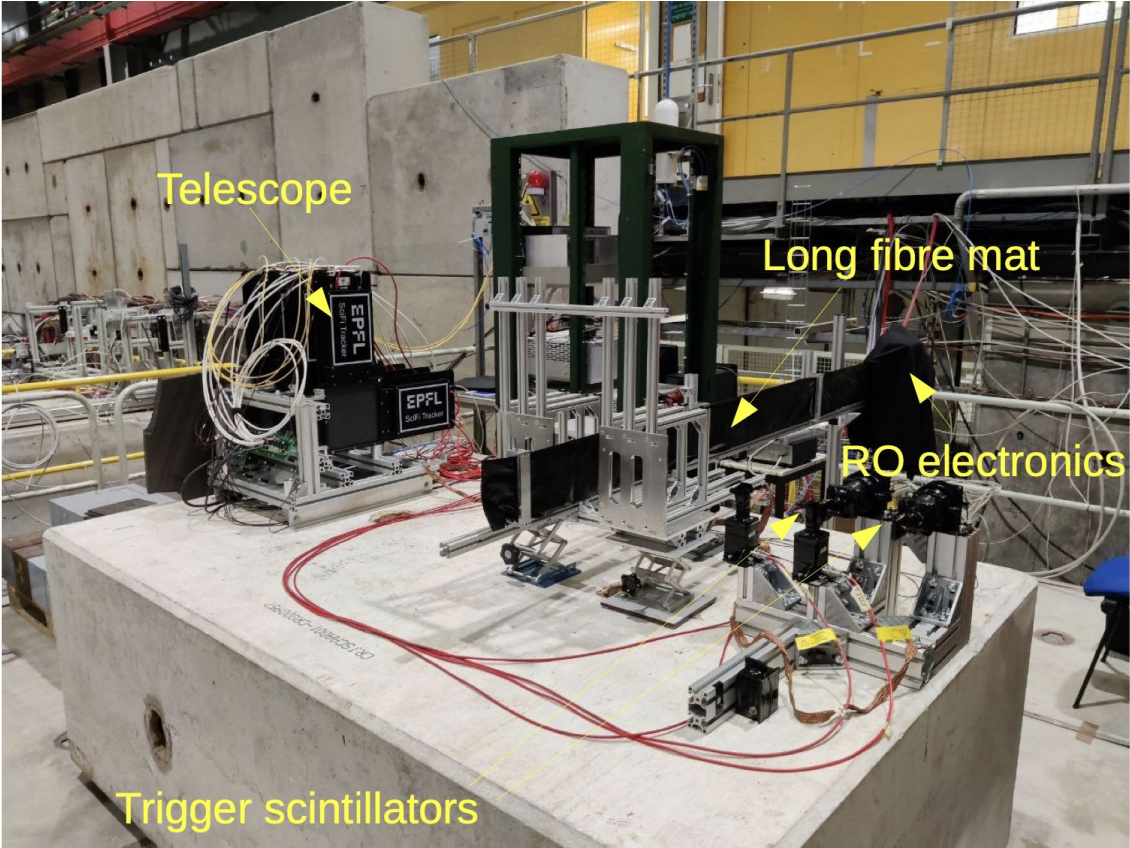
Readout with FPGA KC 705

Single channel boards with piezo stages for fine alignments

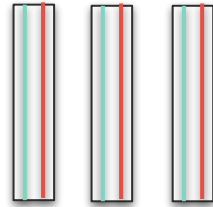
RICH



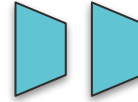
# SciFi set-up



ECAL



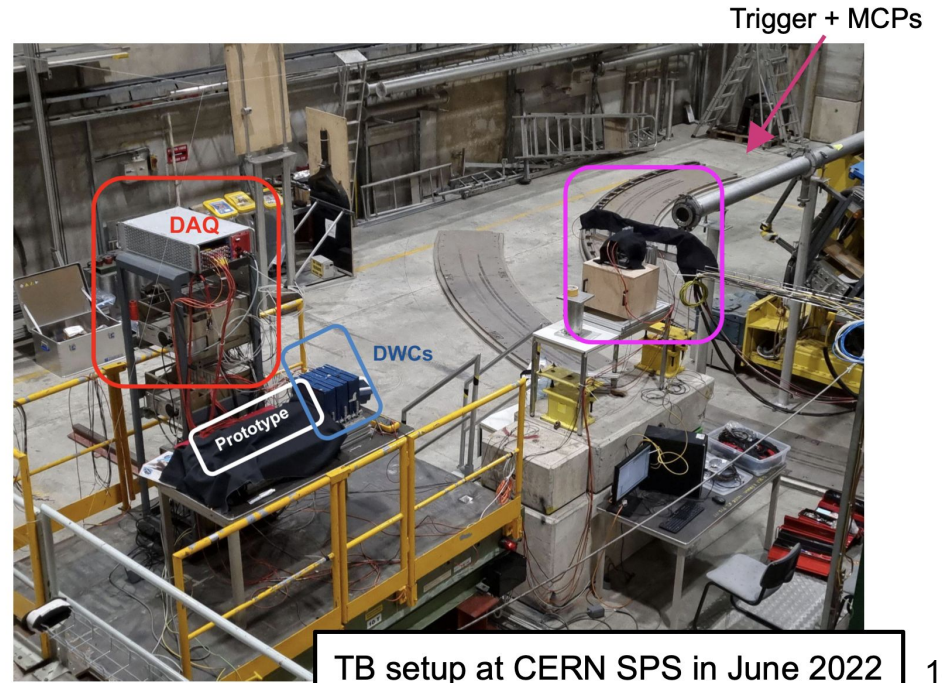
DWCs



MCPs

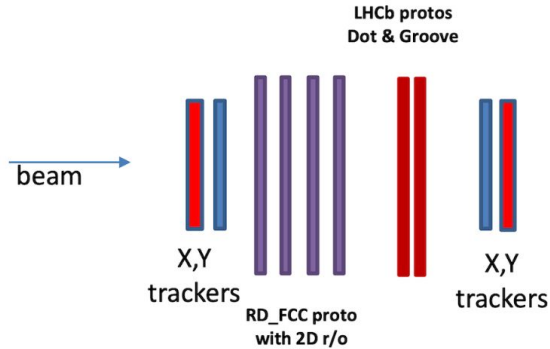


Scint.



TB setup at CERN SPS in June 2022

# TB 2023 1<sup>st</sup> setup - APV



## 6 Chambers:

- 4 RD\_FCC uRWELL with 2D readout (strip)
- 2 LHCb uRWELL (pad r/o): Dot & Groove

**Trigger:** scintillating pads upstream and downstream in AND configuration

**Trackers:** 4 uRWELLs with 400 um strip readout

