Construction of a Forward Diffractive Detector prototype with new light readout

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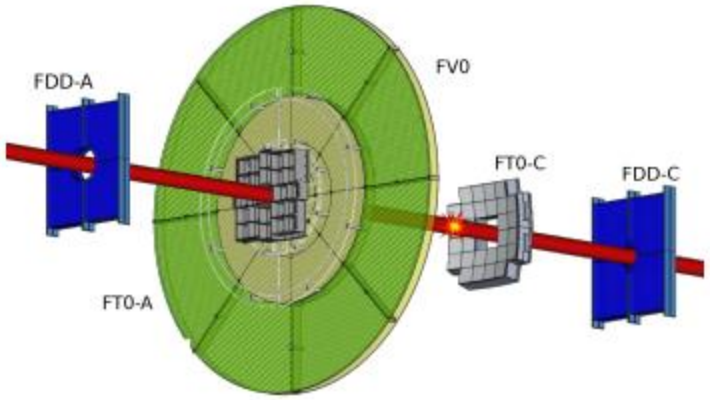
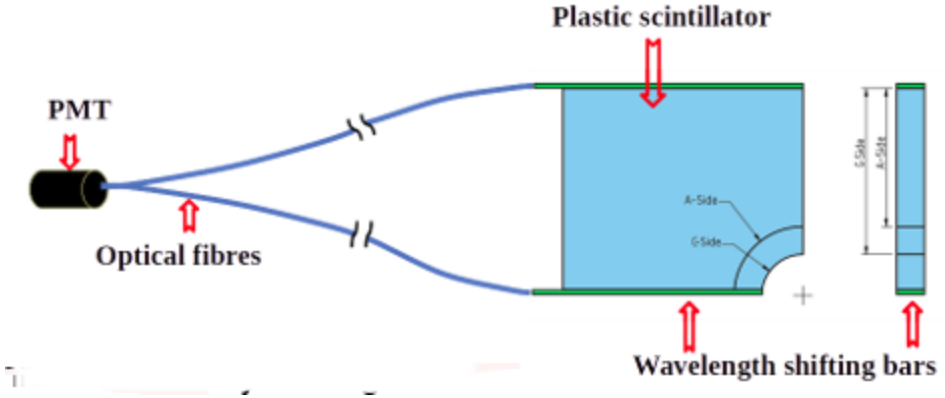
Outline

- FDD concept
- Motivation for the project
- Problems shown on a graph
- Achieving our goals
- Testing our hypothesis

FDD: what is it?

- FDD – Forward Diffractive Detector for ALICE – consists of two parts, FDD – A and FDD - C, as pictured in figure below [1]
- Each subdetector consist of two layers made of four pads, which consist of two wavelength shifter bars coupled in two sides of the scintillators to transpoport the light via bundle of 192 fibres [1]

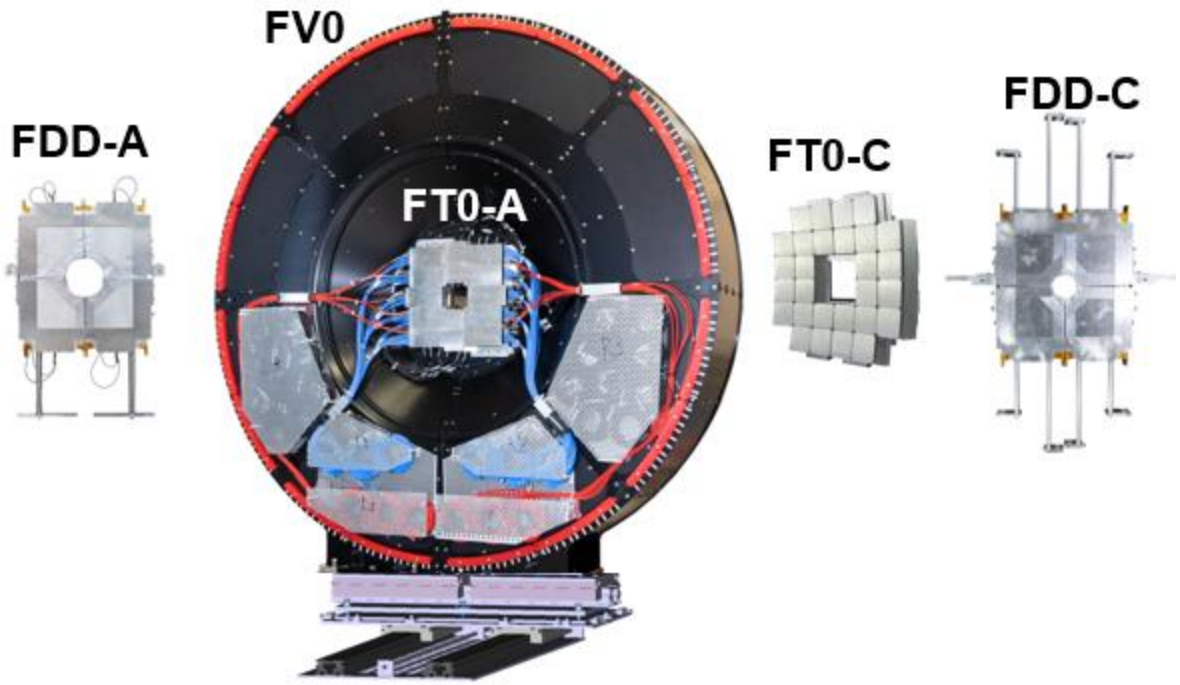




Rojas-Torres, S. & ALICE Collaboration. (2020). The forward diffractive detector for ALICE. In *PoS(LHCP2020)* (Vol. 221) [Conference-proceeding]. https://pos.sissa.it/

What does FDD do?

- FDD measures [1]:
  - Luminosity
  - Minimum latency interaction trigger
  - Precision collision time and vertex
  - Centrality
  - Also beam monitoring and beam background



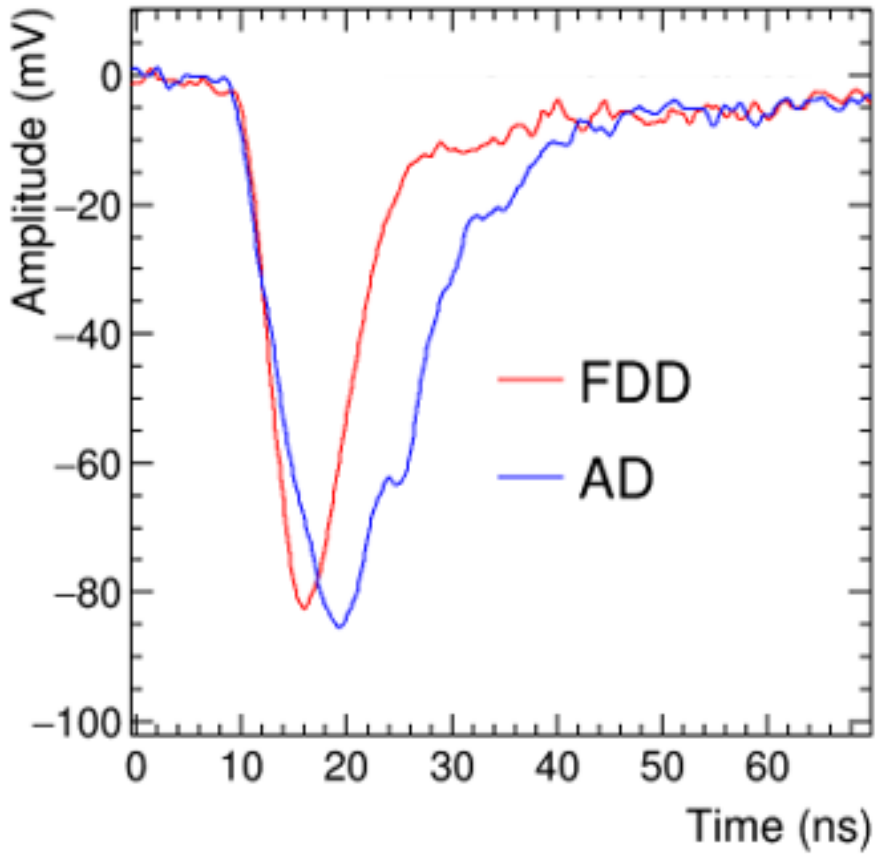
Motivation for the project

- Current FDD detector manifests long tails
- For run 4 this problem needs to be eliminated
- Desired time length of this signal should be less than that of a previous one, approximatelly 25ns

Current problem

- Problem with long tails of signals received
- Saturation problem for high multiplicty
- Signal time for one particle is too long
- The reduction in time could increase dynamic range of ADC/QDC

Problem with FDD ilustrated

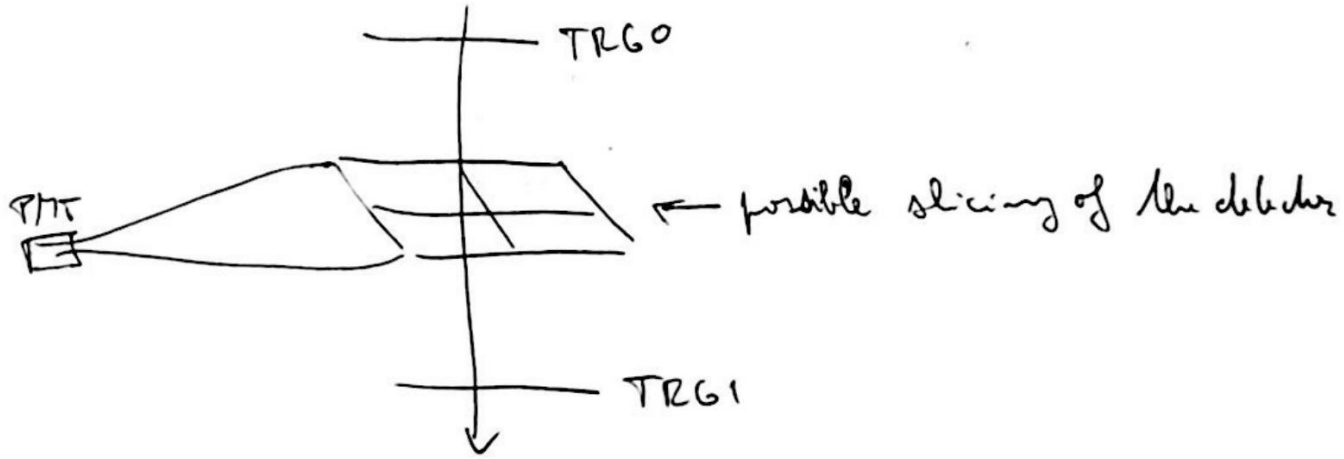


Proposed sollutions

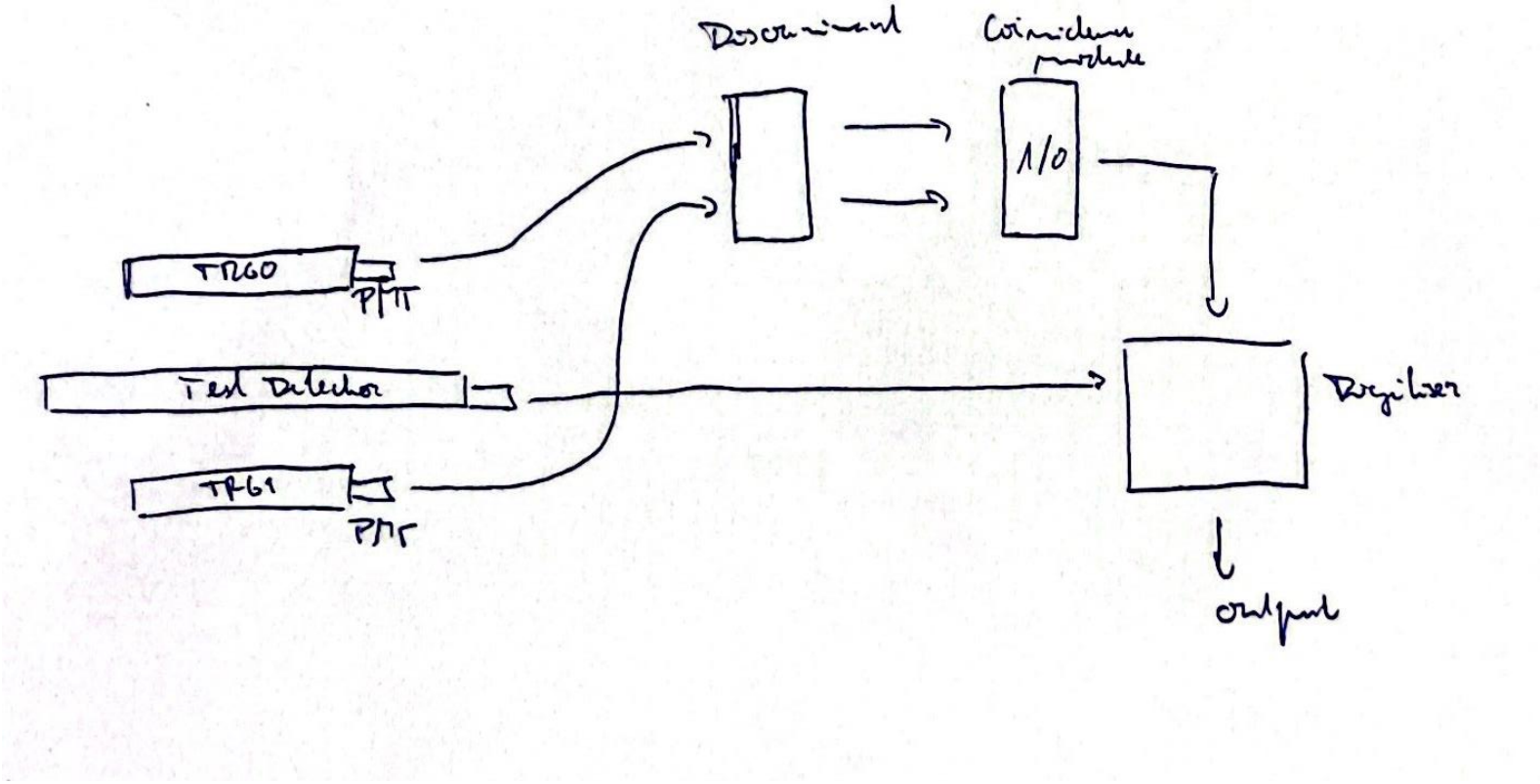
- Current main proposal deals with segmentation of scintillator slab
- Silicon PMTs

How to test our hypothesis

- One possibility is to use comic radiation, but this process is too slow
- Another option is to use laser, we just need to find reliable setup



Set up scheme for cosmic rays



Let's see what the future brings...

- We are guessing what will work; need to test first hypothesis by performing first cut
- After studying more about detector physics and performing first cut (hopefully in October 2024), we will explore optimal solutions

References

1. Rojas-Torres, S. & ALICE Collaboration. (2020). The forward diffractive detector for ALICE. In *PoS(LHCP2020)* (Vol. 221) [Conference-proceeding]. https://pos.sissa.it/
2. https://cernbox.cern.ch/external/public/FEFH7mn1HBRLDNp/ALICE-coffeeTalkNov2022.pptx
3. https://pos.sissa.it/390/779/pdf