



# 2D tracking efficiency in the GCRT

2017 TRG/DAQ workshop

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# Introduction

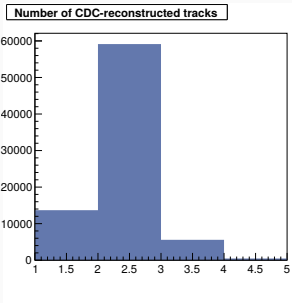
- global cosmic ray run 3896 to 3899 (this week)
- compare tracking between offline CDC reconstruction and online trigger with 2D tracker output
  - $\text{efficiency} \equiv \frac{\text{events with 2D triggers}}{\text{events with CDC tracks}}$
  - About 80000 events recorded with 2D data (1/8 of total)
  - using this commit of BASF2 head

```
commit 12b7a95e2dcf55e43f4f9ec5f4736a752a1dd676
Author: Manca Mrvar <manca.mrvar@desy.de>
Date:   Mon Jul 31 12:53:04 2017 +0900

    Arich DB importer updated.
```

- steering file  
cdc/examples/performance/runReconstruction.py

# Multiple tracks in offline reconstruction



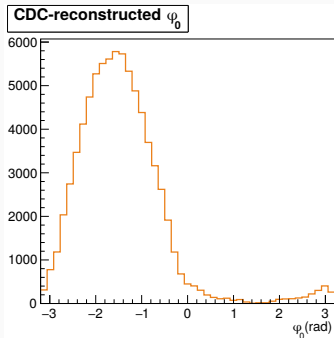
```
[INFO] Processed: 1 runs,  
track #0 phi0: -2.3605 rad  
SL * Layer * wire  
8 * 2 * 60  
6 * 2 * 53  
4 * 2 * 45  
4 * 2 * 46  
2 * 2 * 40  
track #1 phi0: -2.3703 rad  
SL * Layer * wire  
4 * 2 * 146  
6 * 2 * 186  
8 * 2 * 226  
8 * 2 * 227
```

- new BASF2 display seems to require a working OpenGL environment, which I don't have.
- selection
  1. select tracks in the upper half plane
  2. select a track with the smallest reconstructed  $d_0$

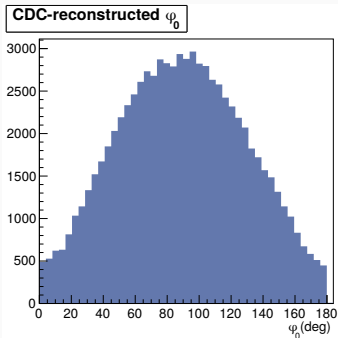
# offline track reconstruction using CDC data

Only tracks with hits in the upper half plane!

as reconstructed



rotated

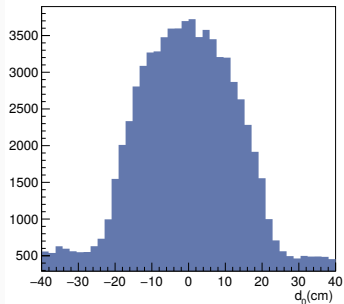


# Sanity check

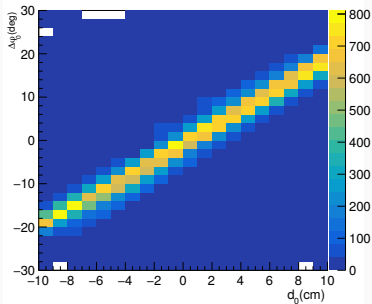
reconstructed  $d_0$

$$\Delta\phi_0 = \phi_{0,2D} - \phi_{0,CDC}$$

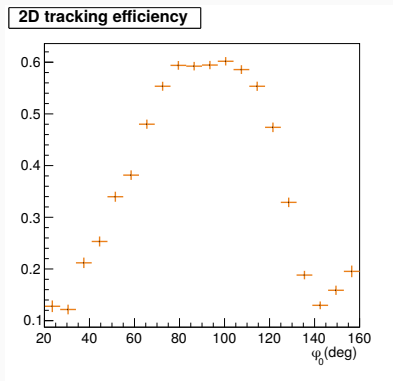
CDC-reconstructed  $d_0$



$\Delta\phi$

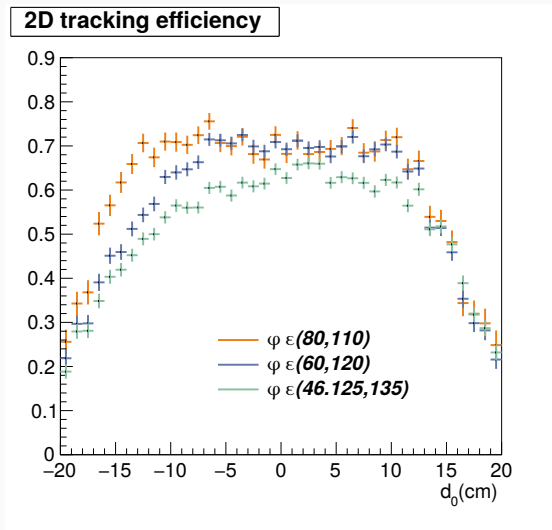


# $\phi_0$ dependence of 2D Tracking Efficiency

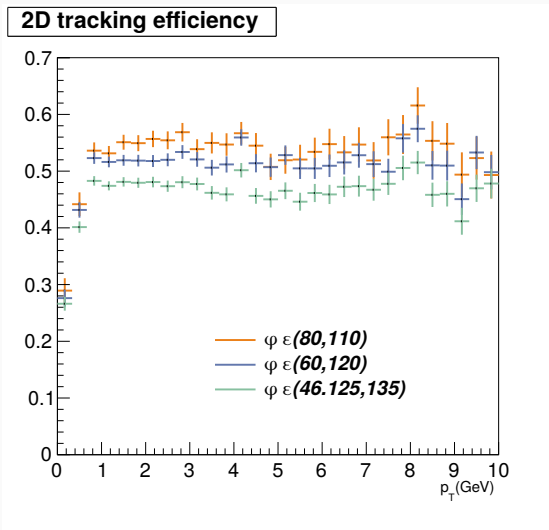


- low eff. near the edge due to less-than-full acceptance
- some broken links between Merger and TSF in SL0
  - not sure if this explain everything

# TRG Tracking Efficiency



# Efficiency w.r.t. transverse momentum

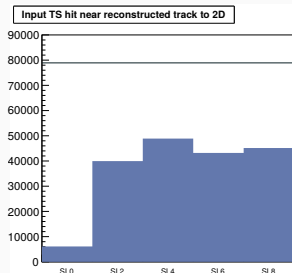




What I showed is the tracking efficiency of  
the **whole CDC Trigger system up to 2D**.  
What about the tracking efficiency of  
**2D itself?**

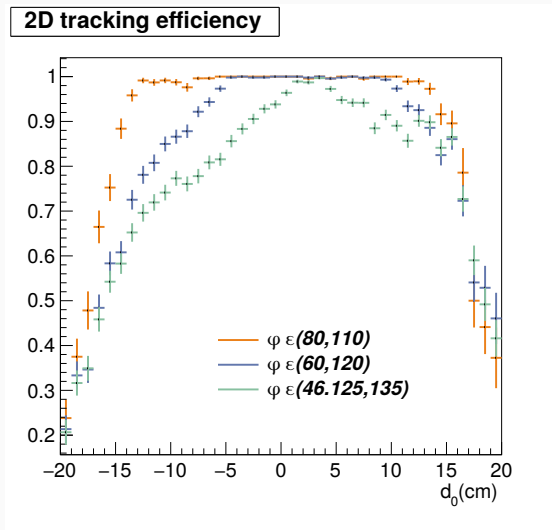
# Procedure to check for related TS hit

1. From the track fit result, get the local wire ID in local layer 2 or 3 (priority position) for each axial Super Layer
2. Check the input TS hits with the nearest 5 IDs to the wire ID e.g. for a local wire ID 23, TS ID (21, 22, 23, 24, 25) are checked
3. If there is any match, mark it as a related TS hit in that SL



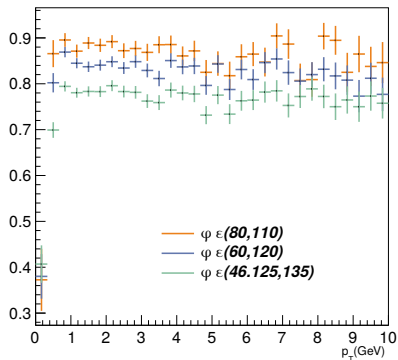
2D needs at least 4 track segment hits to find a track.

## 2D tracking efficiency (4 or 5 input TS hits)

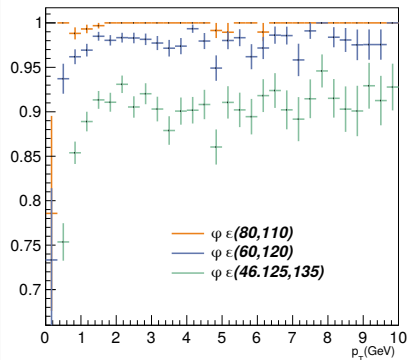


# Efficiency w.r.t. $p_{\text{T}}$ (4 or 5 input TS hits)

2D tracking efficiency

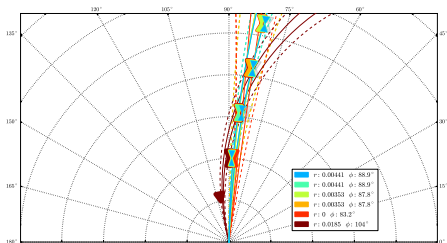
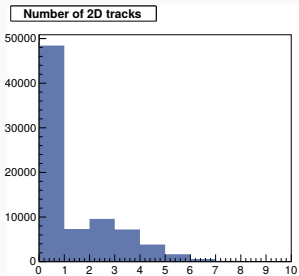


2D tracking efficiency ( $|d_{\text{T}}| < 10$  cm)

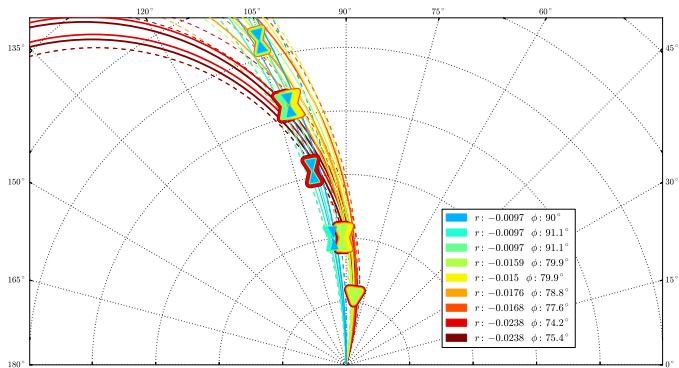


# What's next?

- Keep checking 2D efficiency with new TRG firmware update
  - without magnetic field,  $p_T \gtrsim 8 \text{ GeV}$
  - will spot missing TS, but extra TS would still affect ETF
- To understand the  $\phi$ -dependency of the tracking efficiency
- Plan to reduce the clones



Questions?



# backup

