VHMPID L0 trigger
Status report

Sona Pochybova
16/02/2010

Data sample:
- pp@10 TeV, MB, B=0.5 T
- 1,5 Mevents

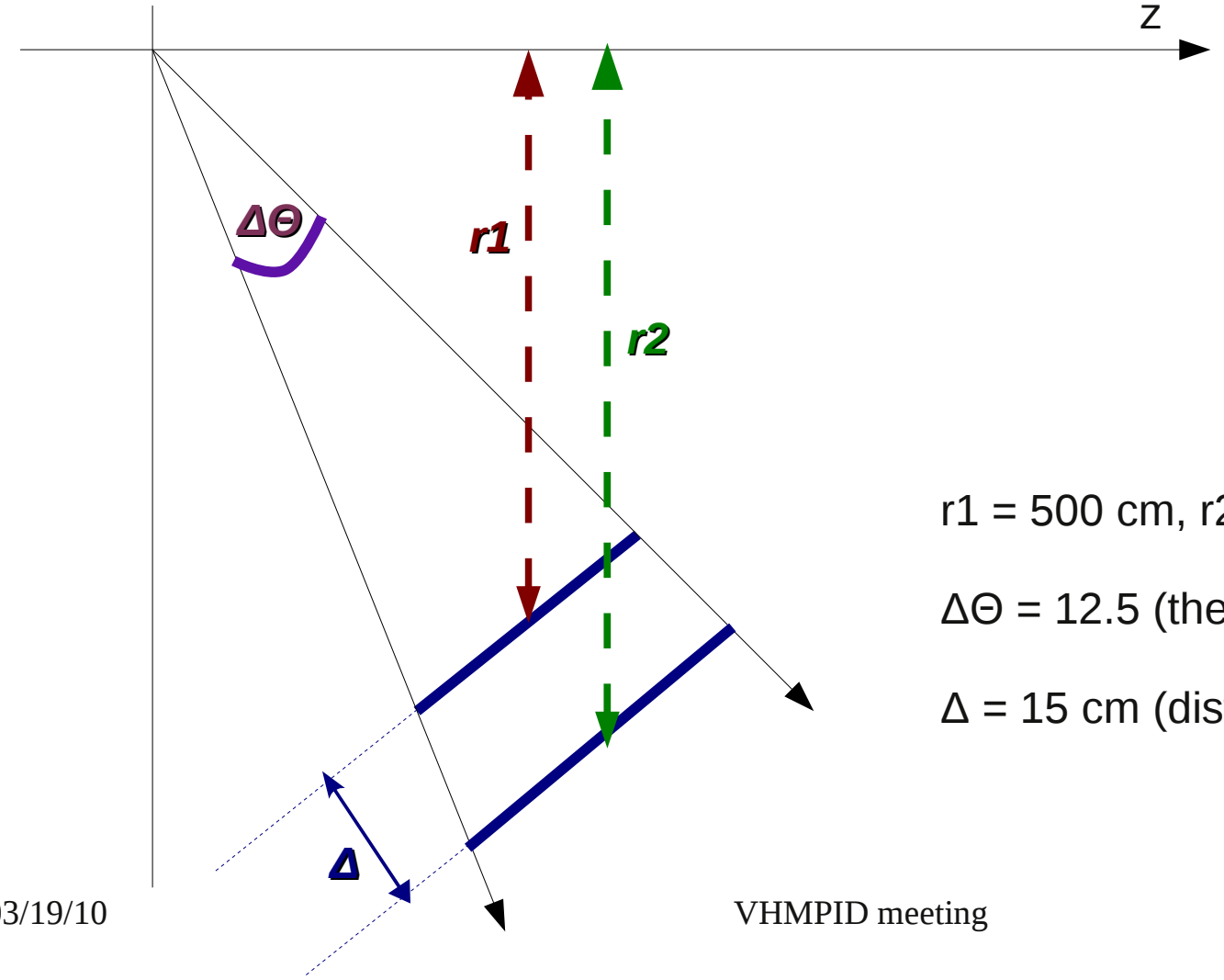
Track cuts:
- No kinks
- Only tracks from module's acceptance

Acceptance:
- Θ ~ 22.5 +/- 6.25
- Φ ~ 20. +/- 10.

Introduction

- Last time:
  - Study of particle properties inside acceptance of one module (Θ ~ 22.5, Φ ~ 20.)
  - Possible triggering strategy
    - #Hits > 0
    - Possibility to cut out low-momentum particles (p < 2 GeV/c)
- Task
  - Investigate the hit pattern on the planes situated in space

Geometry of the trigger



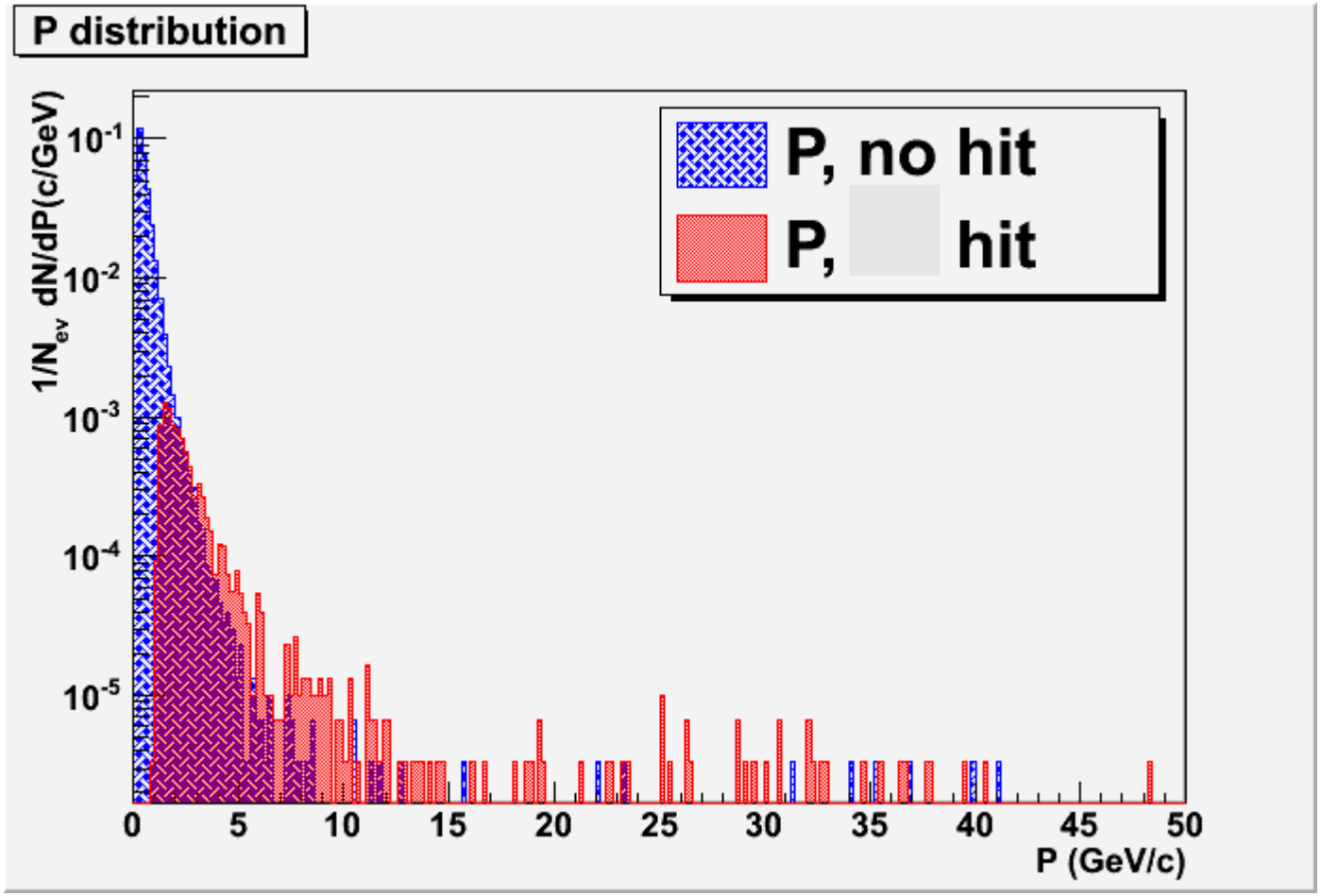
A sketch of how we define the geometry of the two trigger planes in the, projection in Θ

r1 = 500 cm, r2 = 514 cm

ΔΘ = 12.5 (the width of the planes in theta)

Δ = 15 cm (distance between planes)

Momentum

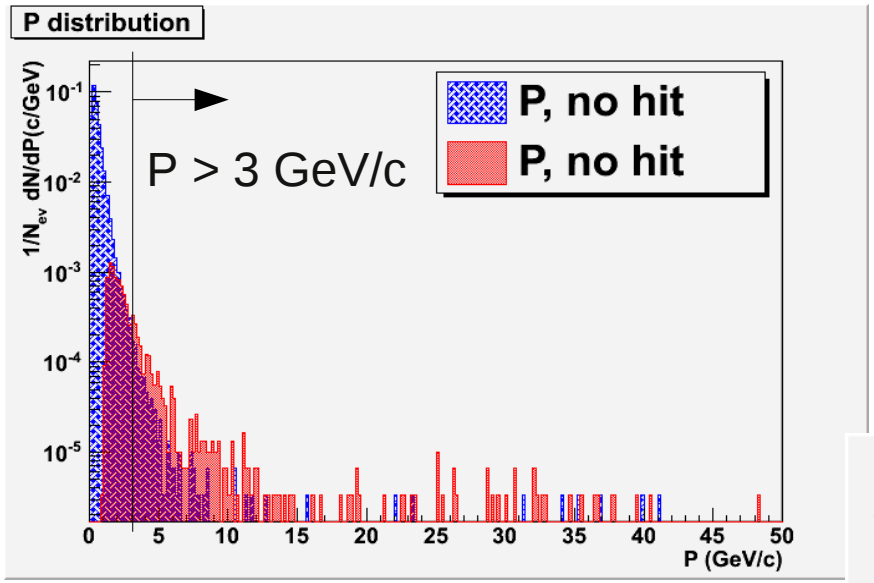


Momentum distribution of tracks inside the module acceptance, based on whether it is a **"hit"** or **"no hit"**.

We see that the **"hit"** flag selects tracks with ***p > 1 GeV/c***

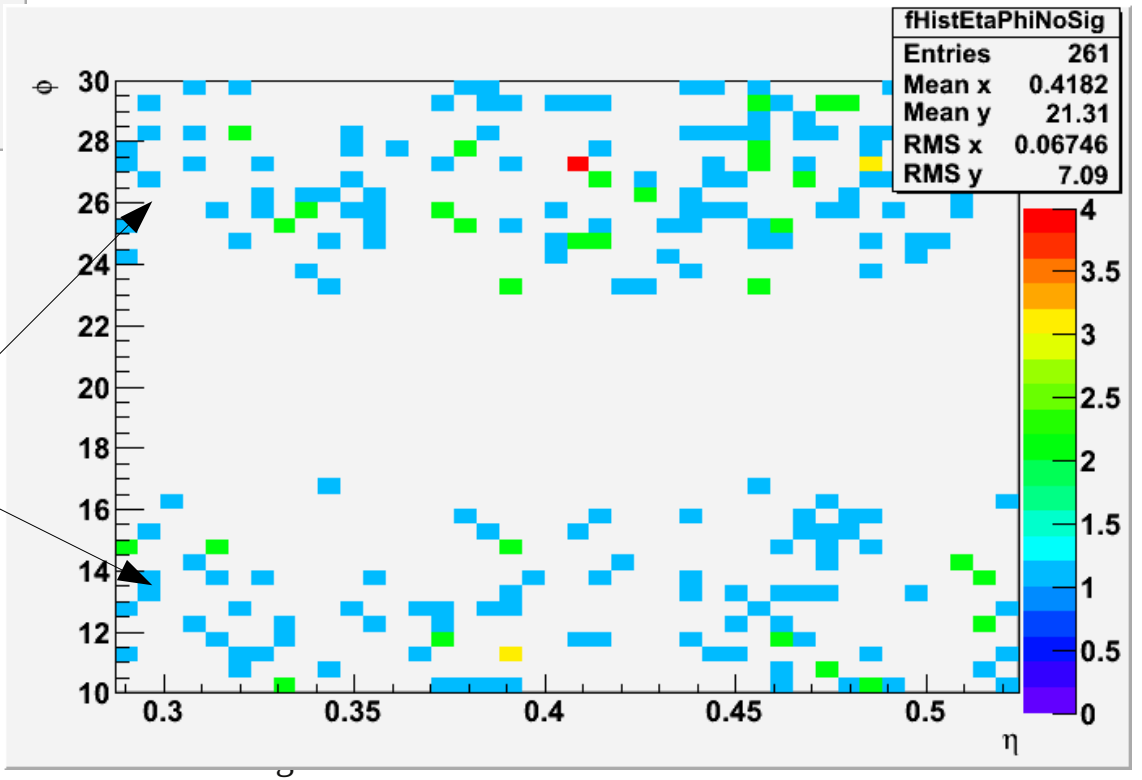
If a track hits **both planes** within the acceptance - **"hit" track.**
If it does hit **one/none** of planes in acceptance - **"no hit" track**.

No-hit tracks, p > 3 GeV/c

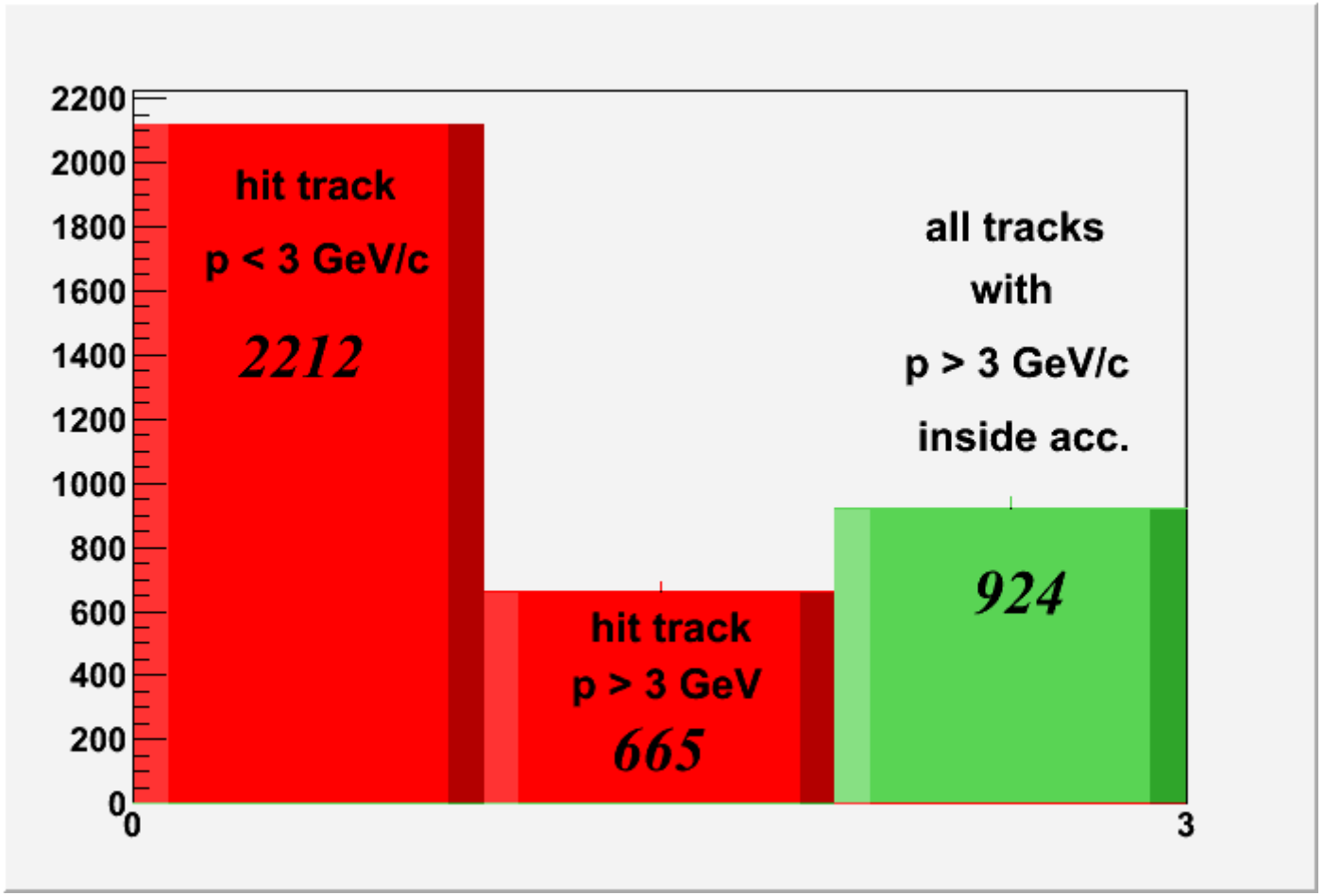


There are tracks with p > 3 GeV/c that do not leave a hit in the detector

They are in the center of the module



Purity and efficiency



Purity: ~23%

Eff: 72 %

$$Purity = \frac{Number\ of\ higt\ tracks(p > 3\ GeV/c)}{Number\ of\ hit\ tracks}$$

$$Efficiency = \frac{Number\ of\ hit\ tracks(p > 3\ GeV/c)}{Number\ of\ tracks(p > 3\ GeV/c)\ inside\ module's\ acceptance}$$

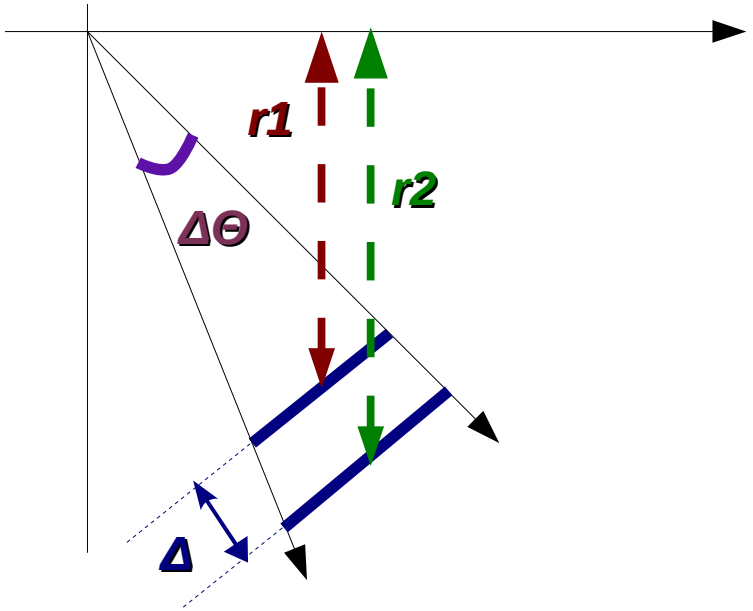
Summary and outlook

- Geometry introduction
  - L0; far from interaction point, low momentum tracks will not reach it
    - Distance – natural filter
    - Using only “hit” flag we achieved purity ~ 23 %
- Outlook
  - Design segmentation to be able to distinguish two hits from each other and see whether it can further improve the selection in terms of purity and efficiency

Monday contribution proposal

L0 trigger

Geometry:



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Φ ~ 20. +/- 10.

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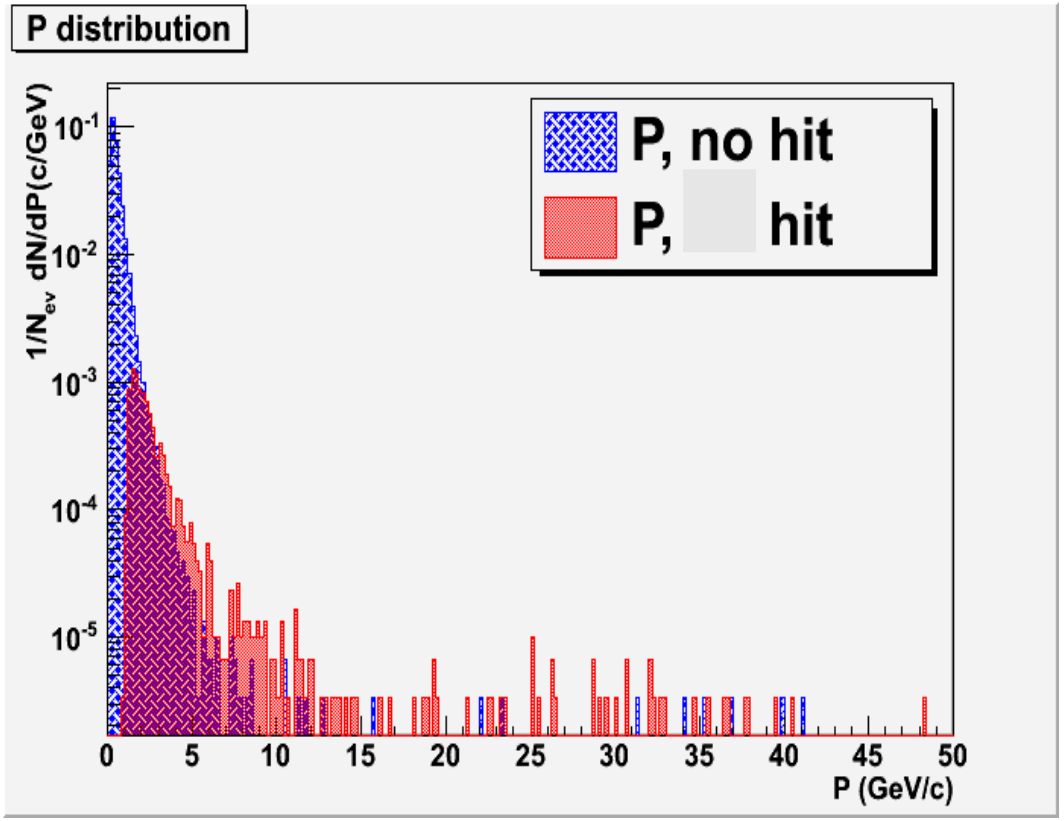

"hit" - track hits both of the planes
"no-hit" - track hits only one/none of the planes

"hit" flag selects tracks with p > 1 GeV/c

Distance – natural filter

$(p > 3\ GeV/c)_{ALL}$	$(p > 3\ GeV/c)_{HIT}$	All hits
924	665	2877

Purity: ~23%

Eff: 72 %

$$Purity = \frac{Number\ of\ higt\ tracks(p > 3\ GeV/c)}{Number\ of\ hit\ tracks}$$

$$Efficiency = \frac{Number\ of\ hit\ tracks(p > 3\ GeV/c)}{Number\ of\ tracks(p > 3\ GeV/c)\ inside\ module's\ acceptance}$$

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