Updates on ALICE FoCal trigger study

- ♦ Sample
 - MinBias, 2.5k events
 - It is an Ntuple of hits in the FoCal

Distribution of PDG codes of the particles

• Look at particle information



Particles producing photons

Photons are mainly from pi0 or eta decay.

Reminder

 Longitudinal and transverse distribution of energy deposits, for events with photons.



FoCal Energy per layer, averaged per event

Energy Map on Layer 6 (20 GeV $< E^{hlghest} < 50$ GeV) N0 [MeV]/event [MeV]/ev 70 60 50 40 30 20 0 10 20 30 40 50 60 70 80 90 100 30 40 50 60 70 80 90 100 20 col col Energy Map on Layer 6 Energy Map on Layer 6 (5 GeV < F < 20 Ge\ < 5 GeV [Me^Ŋ]/ev MeV]/ev 30 40 50 60 40 50 60 70 80 70 80

col

col

Energy map on Layer 6

Shower maximum is at layer 6-7. Higher occupancy around the beam pipe hole.

Study for trigger logic

- Definition of the target particle is not clear yet.
 - Isolated direct photons for sure, but what should be the lowest energy?
 - pi0 photons? but again, what should be the lowest energy?
- MinBias sample
 - 3 direct photons, 1 fragmentation photon from 2.5k generated events.
 - \rightarrow Not suitable for signal (= direct photons) study.
- \rightarrow Today: Consider to keep photons with E>50 GeV and see the rejection power.
 - Looking at the photons with $\theta > 0.011$, to avoid beam pipe.
 - (x,y,z) = (5cm, 5cm, 7m) corresponds to $\theta = 0.010$



for E_v>50 GeV

θ_{v E>50 GeV} [rad.]

Cell energies and photon energies

• Checking the 1st and 2nd highest cell energies on the layer 6:



There is a correlation between the highest cell energy and the highest photon energy.

Simple logics

Concept: Requirement of cell energies at the shower maximum.
Logic 1: At least one cell should have E_{cell}>20 MeV in layer 5-8.
Logic 2: At least 3 layers should have a cell with E_{cell}>15 MeV in layer 5-8.
Logic 3: Same as logic 1, but skipping the innermost cells on each layer.
Logic 4: Same as logic 2, but skipping the innermost cells on each layer.

MinBias sample	2500 events
Hits in FoCal	2234 events
After Logic 1	1147 events
After Logic 2	1087 events
After Logic 3	1104 events
After Logic 4	1040 events

These simple logics reduce the number of events to less than half but are quite safe for E_{γ} >50 GeV.



Simple logics cont'd

• Rejected events with E_{v} >50 GeV (Logic 4):

Event	$E_{\gamma}^{highest}$	Highest cell energy [MeV] (incl. innermost cells)			θ_{γ} (highest E _{γ})	
TD	[GeV]	Layer 5	Layer 6	Layer 7	Layer 8	
614	50.9837	1.75833	2.36043	2.98192	3.29509	0.0112398
651	52.4768	5.29891	8.6175	11.1788	9.1148	0.0113957
1199	70.9026	13.9749	11.7462	16.4547	9.96295	0.0136919
1481	57.4542	5.69047	3.47423	4.46936	1.57309	0.0187604
2123	60.7542	18.9504	17.2044	13.6182	11.0958	0.0114106

- ID 615 and 615: γ may be too close to the beam pipe hole?
 - Note: θ is calculated from momenta. Not the direction from (0,0,0).

?

- ID 1199 and 2123: Perhaps the energy is shared with closest cells?
- Next steps
 - Make 3x3 clusters of cells
 - Look into the event of ID = 1481