Shielding studies

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Photon detector system





Reinforcing shielding with lead plate Shield_track_xy_all_front_0

* Shielding was shortened for 0.5m

 The plate (10*10 cm²) Made of lead was imbedded into on the front of the concrete wall

- Studied the background in the shielding and in the forward detector system induced by direct electron beam
- * the wall made of standard 80 cm concrete block was not sufficient to shield GFM and BSM detector from the background
- So the concrete wall was reinforced with lead plate (10*10 cm²) on the front which helped to reduce the leakage

Forward detector system with triangular chamber

Beam Pipe 4.2 cm + Triang chamber Al window 0.5 mm

MC HICS photon beam, E e= 16.5 GeV number_processed_bx: 4722

Shielding - 3-layer Al-Fe-Al 90 cm thick

Shielding - Concrete 30 cm vs 80 cm vs 90 cm AlFeAl

S0 cm shielding
number_processed_events: 6850000
=> 4% of BX
B0 cm shielding
number_processed_events: 18290000
=> 1% of BX
90 cm AIFeAI shielding
number_processed_events: 40100000
=> 2% of BX

Event display

1000 photons of 8 GeV energy

Dump induced background in photon spectrometer

Comparing signal in lanex

Comparing background in lanex

Extrapolated particle positions:

Comparing background in lanex from 8 GeV mono beam with Compton photons

Comparing background in lanex

20

Tracks xy, rear surface

Shielding - Concrete 80 cm thick , 8 GeV

10

1

10⁻¹

The source of background in FDS

lons & other particles in Shielding

Shielding - Concrete 30 cm thick Shield track background pdg ion 0 *.407974e+L 1.388e+04 8.073 191.1 18* Entries Mean x Mean y Std Dev x Shield_track_background_vtxz_vtxx_others_0 Shield track background pdg ion 0 694 10⁶ Entries 2000 2.284 Mean x 10² Mean y 4.157 1500 10⁵ Std Dev x 1.605 Std Dev y 3.202 1000 10⁴ Ξ 500 10 10³ 0 Ν -500 10² -100010 1 -150012000 12500 13000 13500 14000 14500 z, mm 20 10 12 14 16 18 Ζ 10000000000 Shield_track_xy_others_cutz_0 100000000 Shield_track_xy_others_cutz_0 Entries 6.171611e+07 Mean x 15.81 1000000 10² Mean y -180.7 Std Dev : 787 10000 Std Dev y 680.1 100 10 1

0.01

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33

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Put position of the photon + bix + 5 +*

5 enteron

0

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0.0001

23

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40

35

30

25

20

15

10

5

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Dump induced background in photon spectrometer

Dump induced background in photon spectrometer

Energy dependence

8gev

6gev 2gev

■ 8gev ■ 6gev

2gev

Particles weighted in shielding per (BX):

27

Tracks at the front plane of Shielding

In shielding

