Performance of forward spectators detectors in Run8
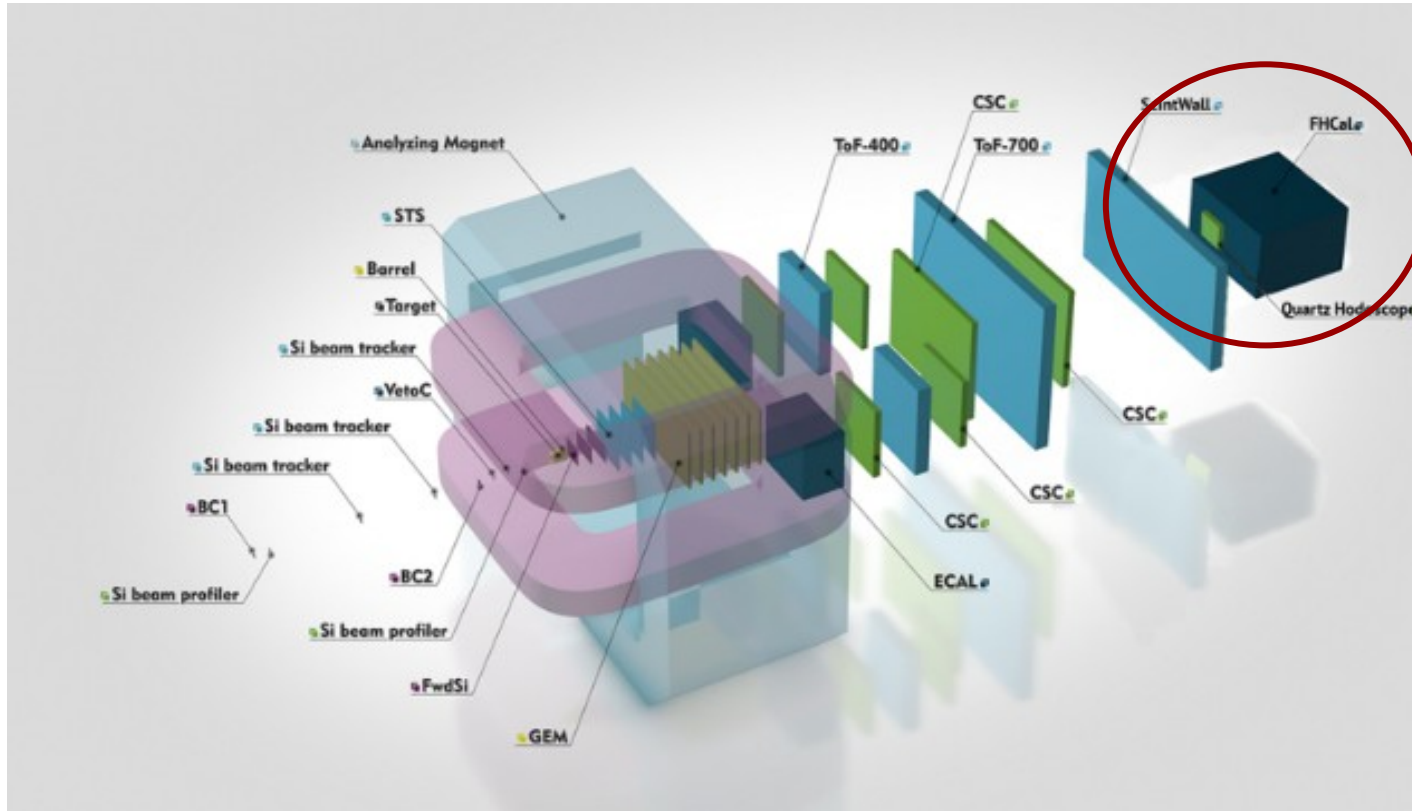
Sergey Morozov
on behalf of INR RAS, Moscow
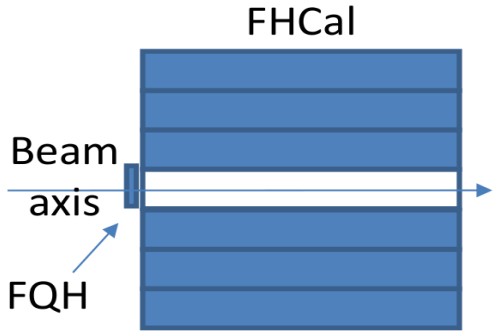
Forward detectors:

- **FQH** (**F**orward **Q**uarz **Hodo**scope)
- **FHCal** (**F**orward **H**adron **Cal**orimeter)
- **ScWall** (**Sc**intillation **W**all)

Can measure:

- charge distributions of spectator fragments
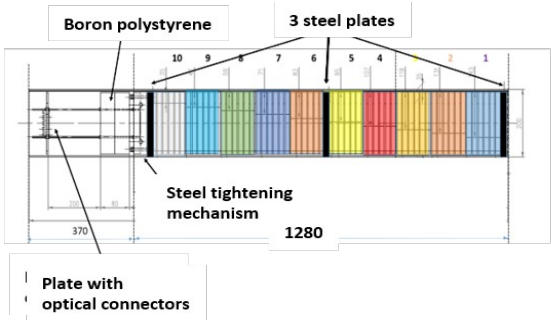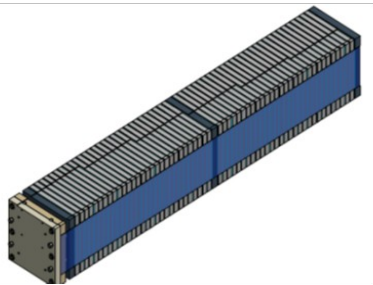- centrality determination
- reaction plane orientation

FHCal - (Forward Hadron Calorimeter):

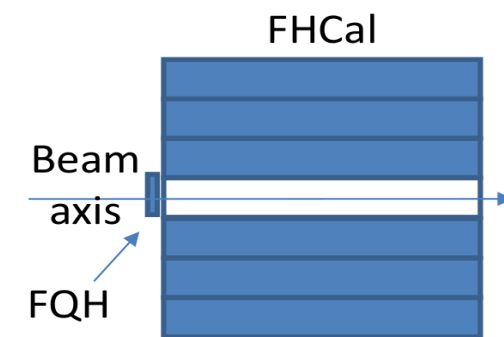20 modules with 10 longitudinal sections (PSD CBM), transverse size 20x20cm^2, length – 5.6 λ_{int}.
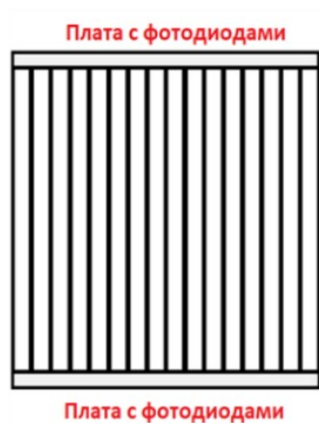
34 modules with 7 longitudinal sections (FHCal MPD like) – 15x15cm^2 (– 4.0 λ_{int}).

Hamamatsu MPPC S12572-010P, 3 x 3 мм^2.

434 readout channels.

Forward Quartz Hodoscope (FQH)

Плата с фотодиодами

Плата с фотодиодами

FHCal

Beam
axis

FQH

SiPMs

4 ММ

10 ММ

160 MM

quartz plate

FQH - (Forward Quartz hodoscope):
16 quartz strips 160x10x4mm^3,
2+2 MPPCs per strip,
Hamamatsu MPPC S14160-3015PS, 3 x 3 мм^2,
64 readout channels (low gain, high gain)

FHCal + FQH → collision centrality estimation, reaction plane
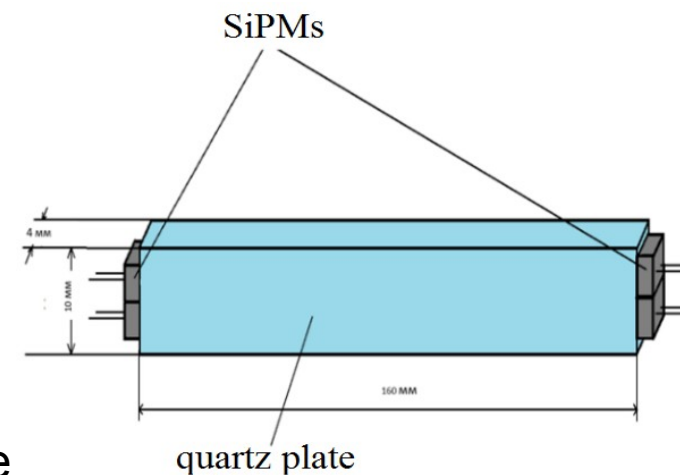
Scintillating Wall (ScWall)

ScWall view inside during production

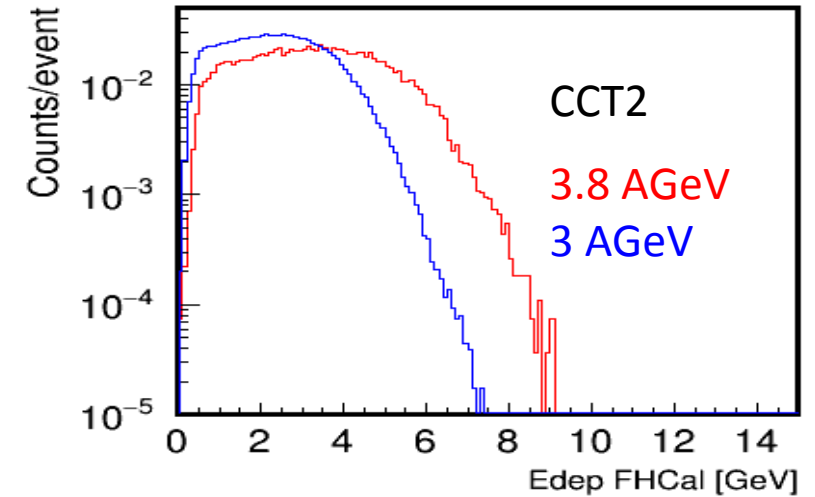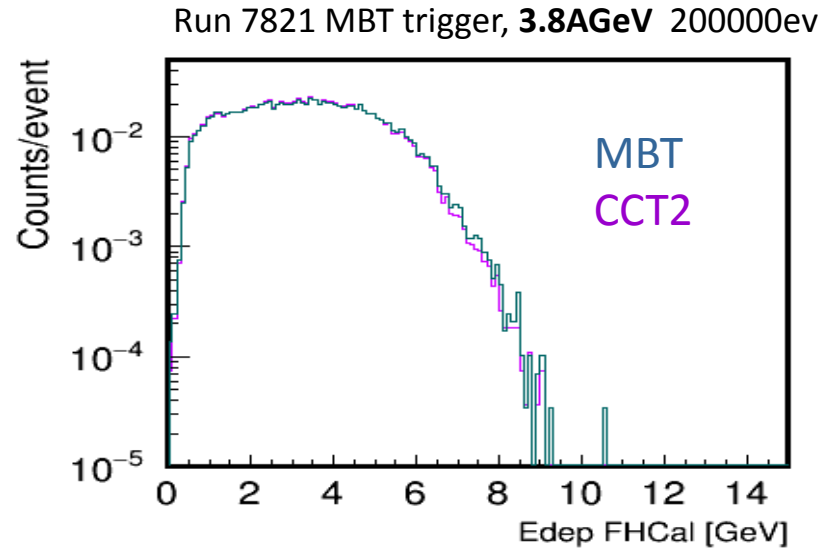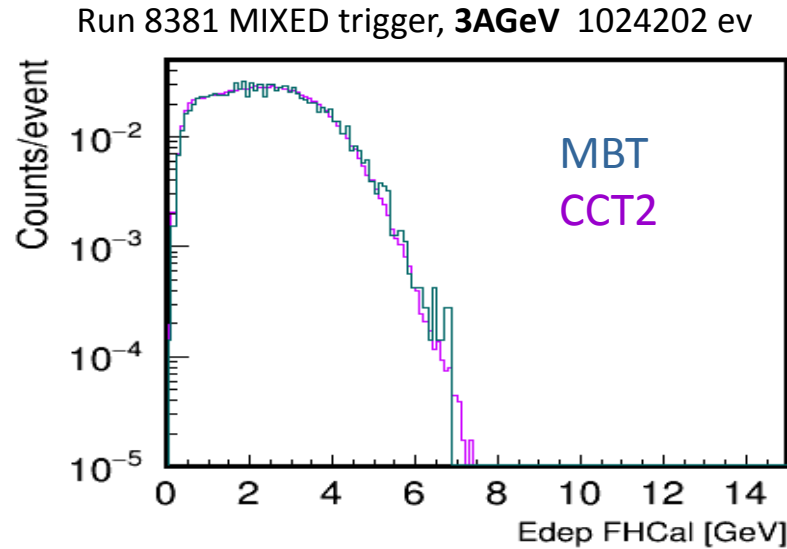ScWall mounted on FHCal frame during SRC run

SiPM connector
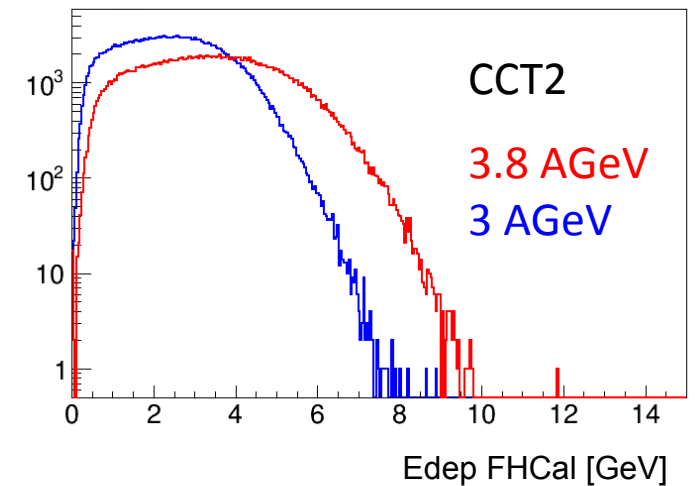PCB on a tile

Charge spectators detection
→ fragmentation model parameters

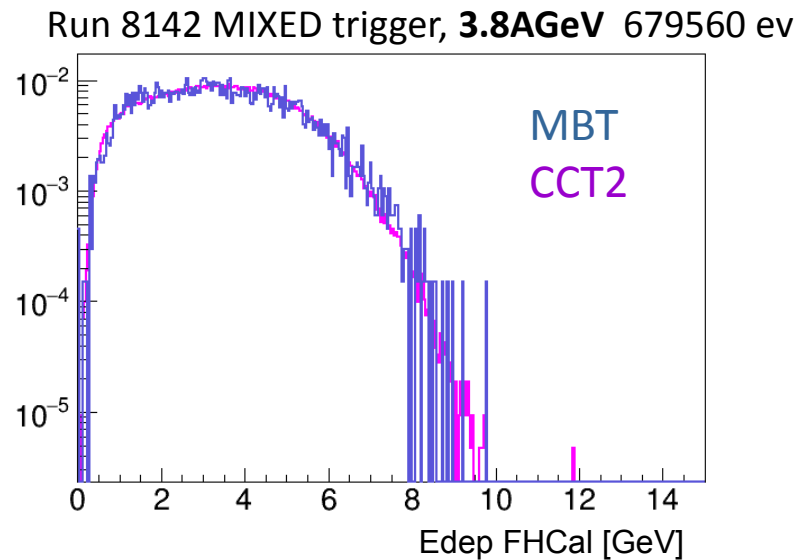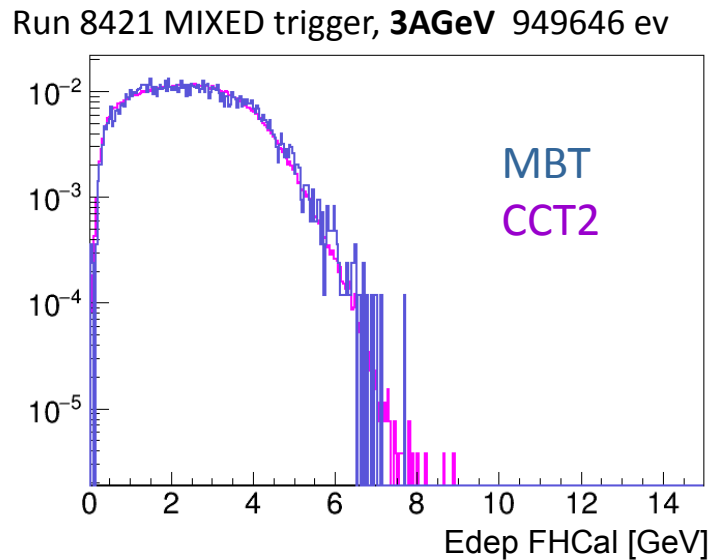+ collision centrality
+ reaction plane

Performance of forward spectators detectors in Run8

Energy visible in FHCal

Run 8381 MIXED trigger, **3AGeV** 1024202 ev

Run 7821 MBT trigger, **3.8AGeV** 200000ev

MBT
CCT2

MBT
CCT2

CCT2

3.8 AGeV

3 AGeV

new bmnroot experimental data production train

Run 8421 MIXED trigger, **3AGeV** 949646 ev

Run 8142 MIXED trigger, **3.8AGeV** 679560 ev

MBT
CCT2

MBT
CCT2

CCT2

3.8 AGeV

3 AGeV

Fragments charge distribution in FQH

new bmnroot experimental data production train

MBT
CCT2
BT

entries scaled to $n_{triggers}$

Strips sum Z^2

run #8142   3.8GeV   MIXED trigger

MBT
CCT2

Strips sum Z^2

new bmnroot experimental data production train
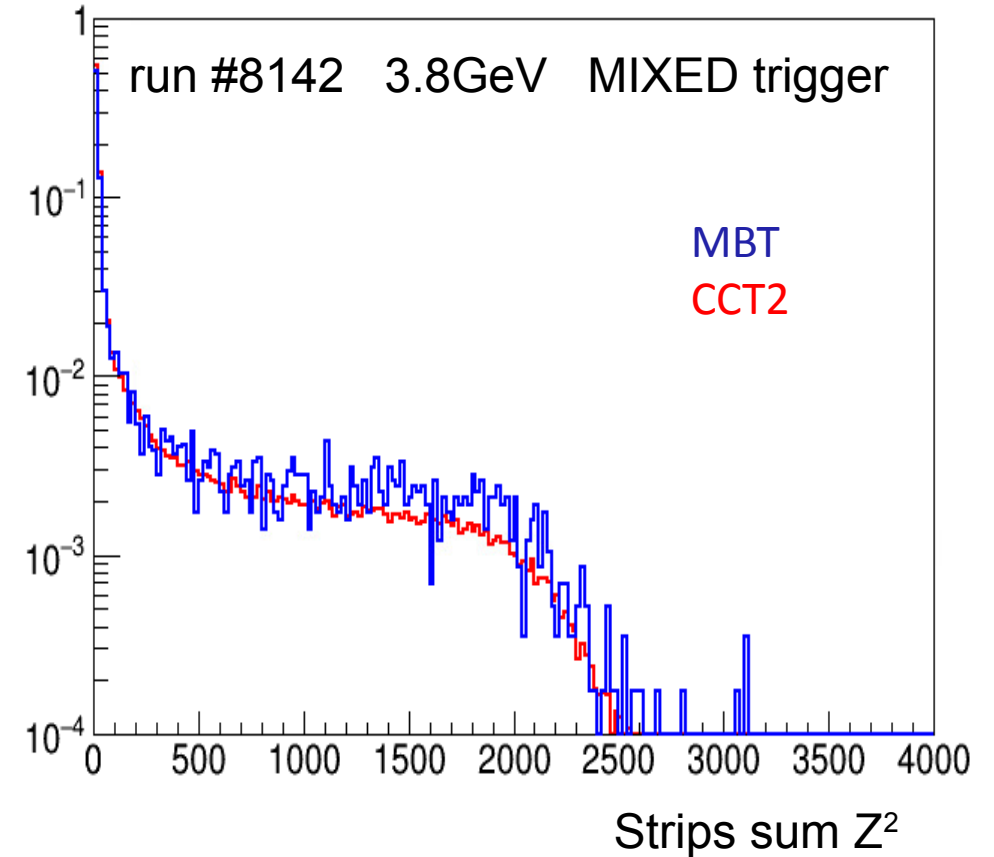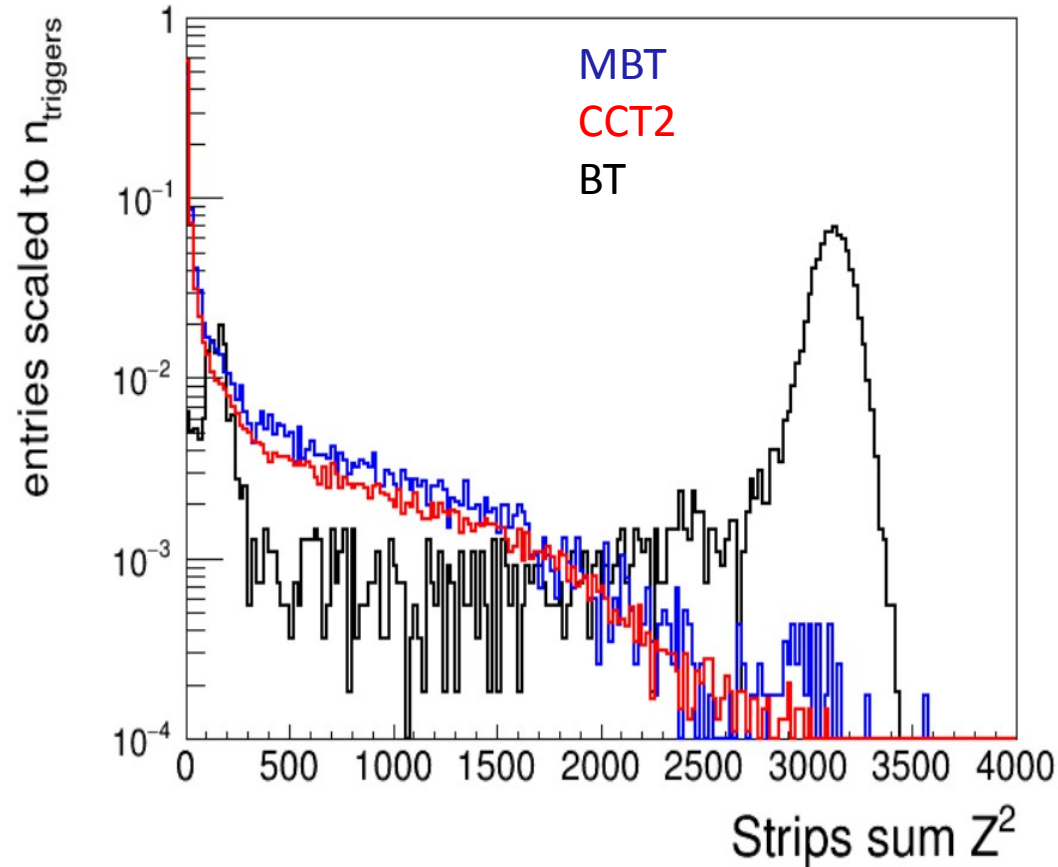
XeCsI@**3.8A GeV**. Run 7821, MBT trigger.

XeCsI@**3.8A GeV**. Run 8142, MIXED trigger.

Z ^{2} (FQH) vs E$_{dep}$ (FHCal)

Z ^{2} (FQH) vs E$_{dep}$ (FHCal)

Performance of forward spectators detectors in Run8

new bmnroot experimental data production train
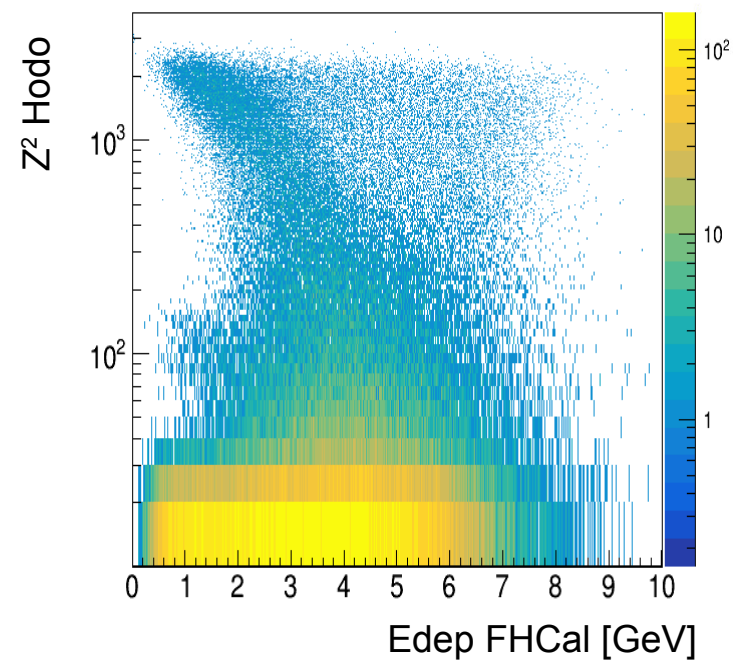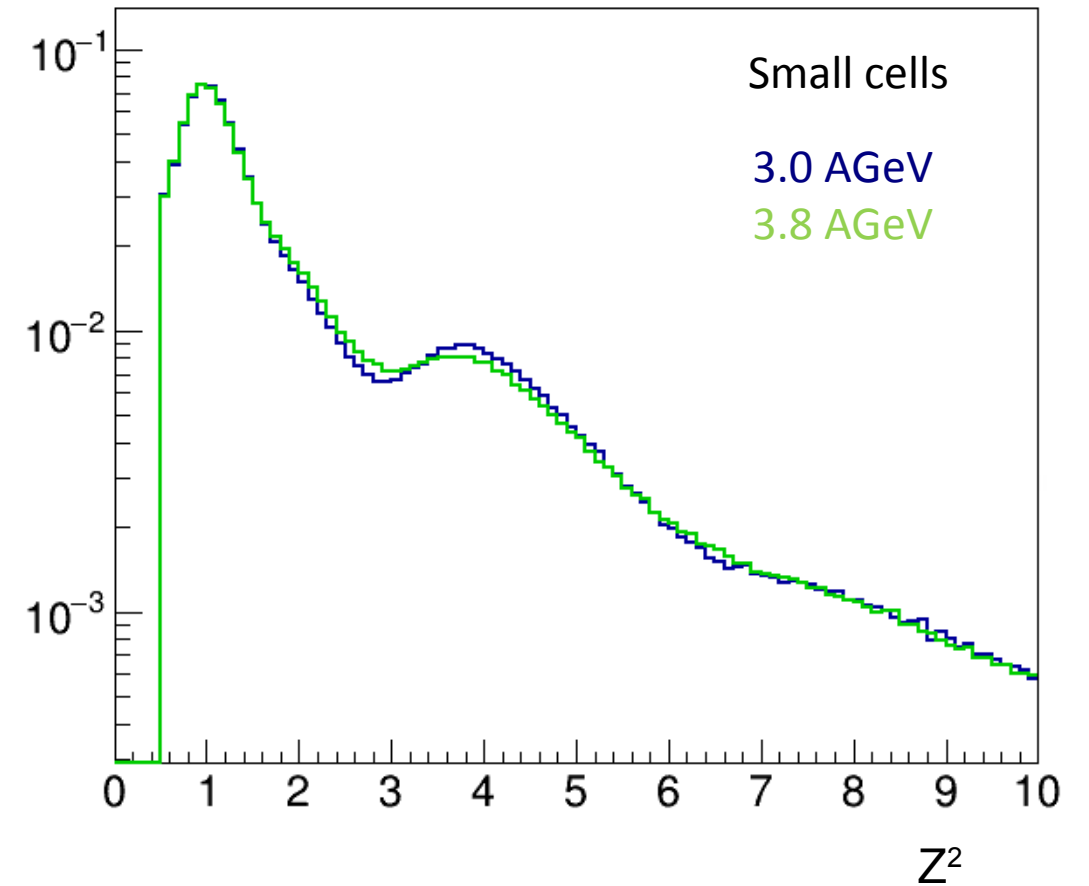
XeCsI@**3.0A GeV**. Run 8381 2% CsI target,
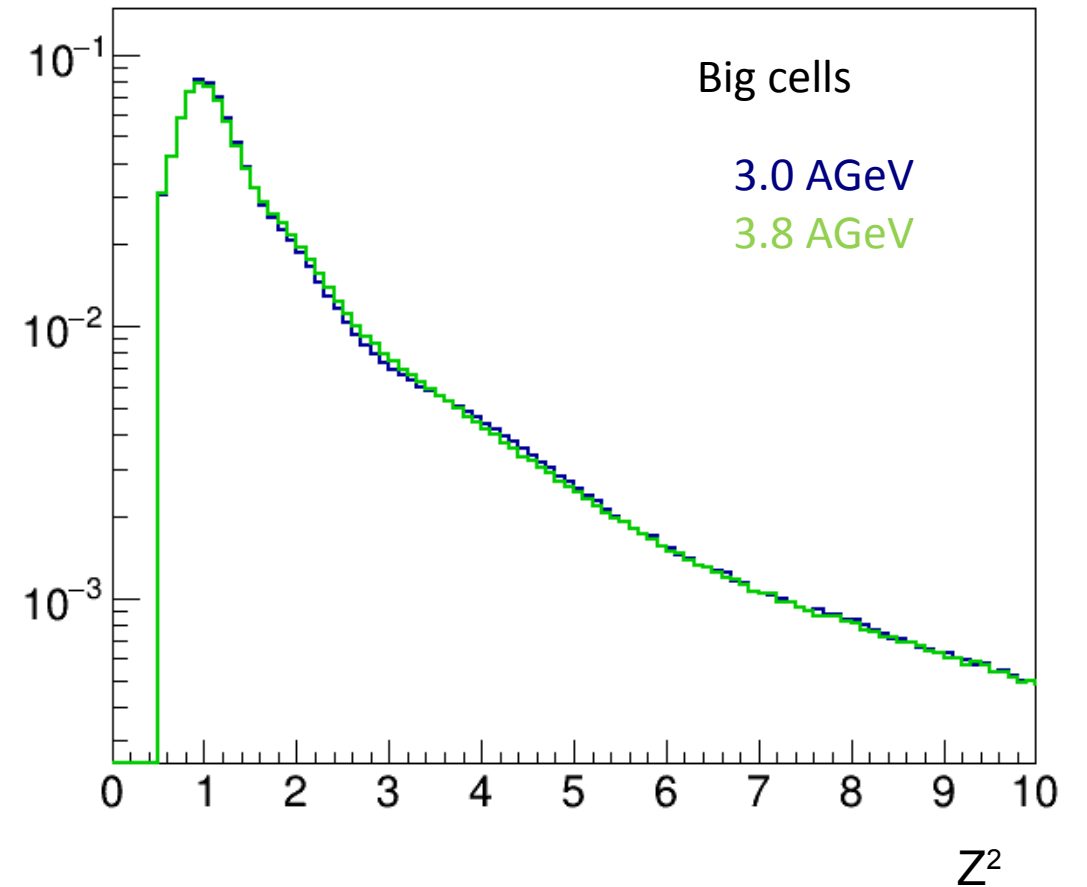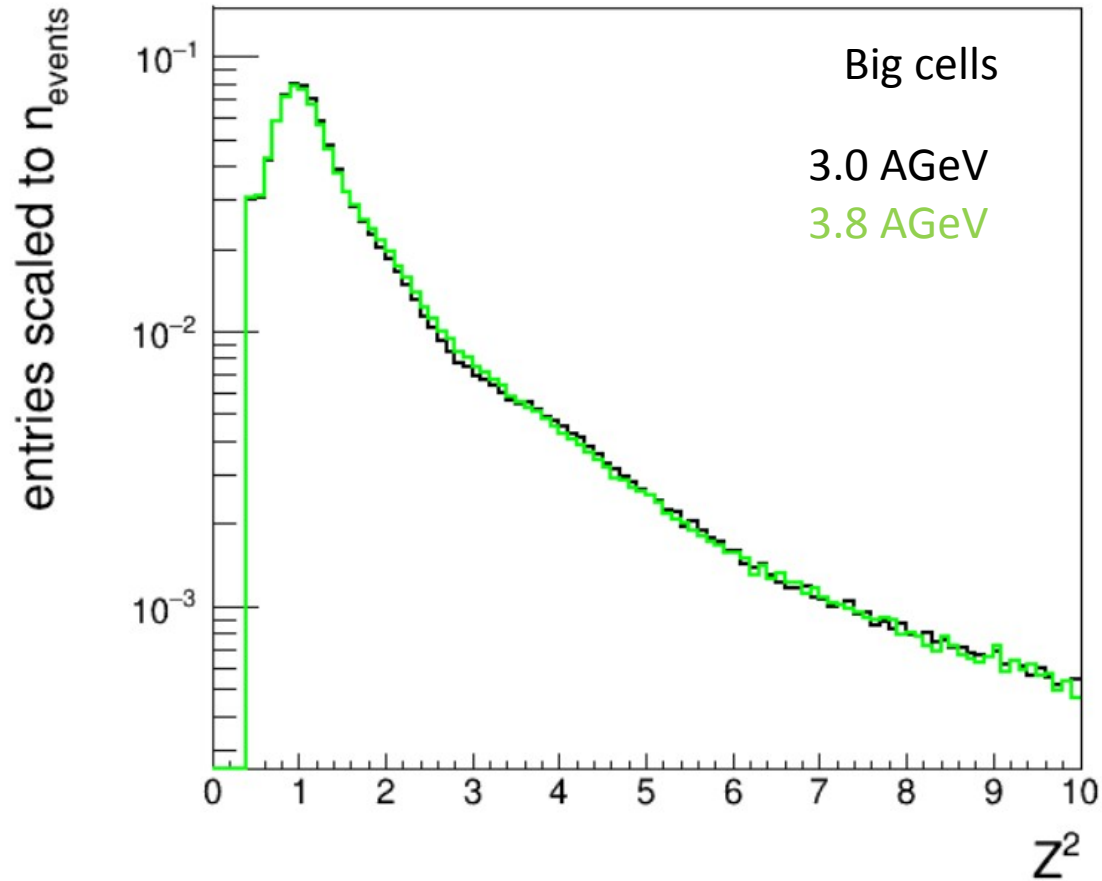Mixed trigger. Selection MBT trigger.
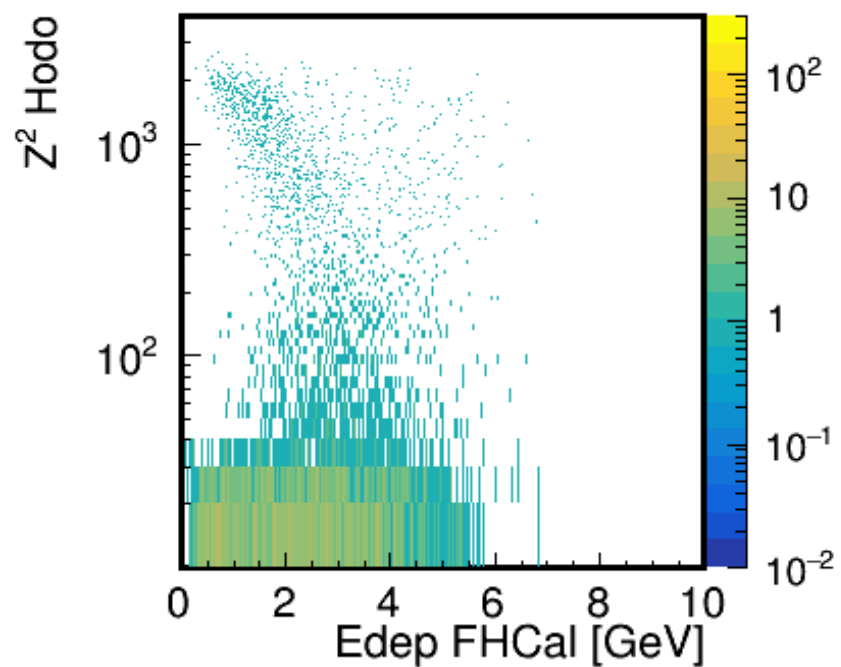
XeCsI@**3A GeV**. Run 8029-8033, MBT trigger.

Z^2 (FQH) vs E_{dep} (FHCal)
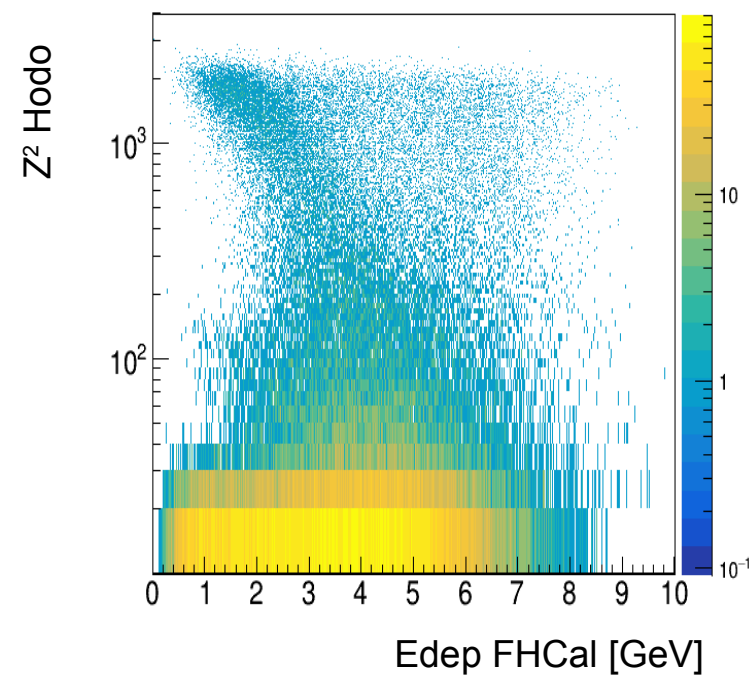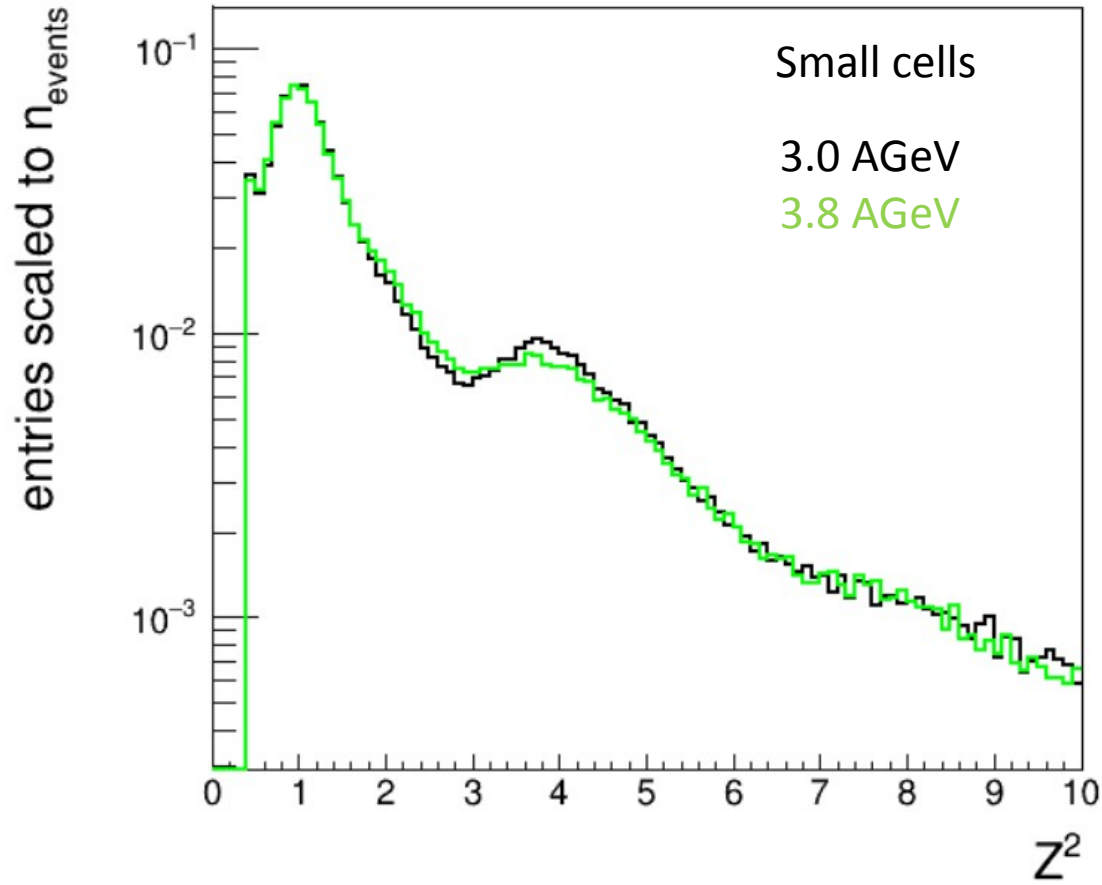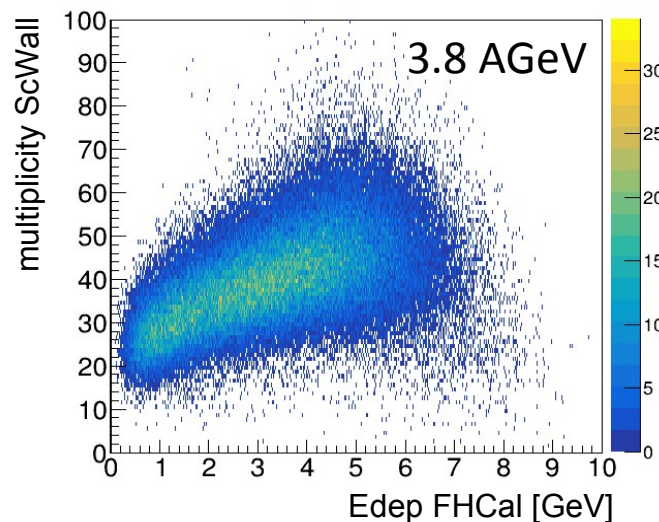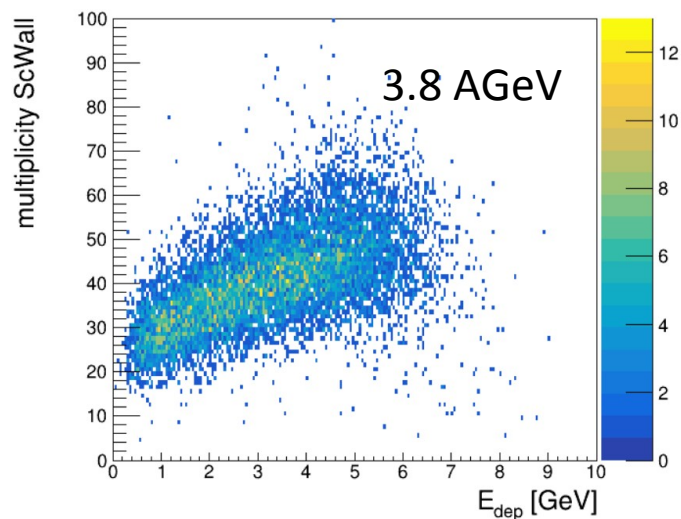
new bmnroot experimental data production train

- Comparison of the charge distributions over the scintillation wall for the two energies at 3.0 and 3.8 GeV for the CCT2 trigger.
- The two cell types (small and big) are presented separately.

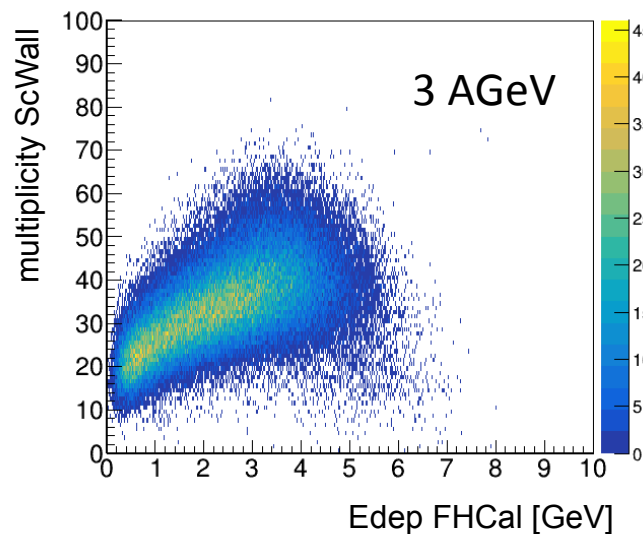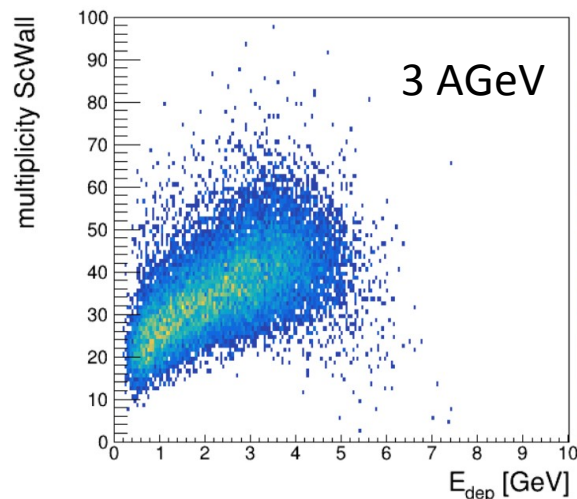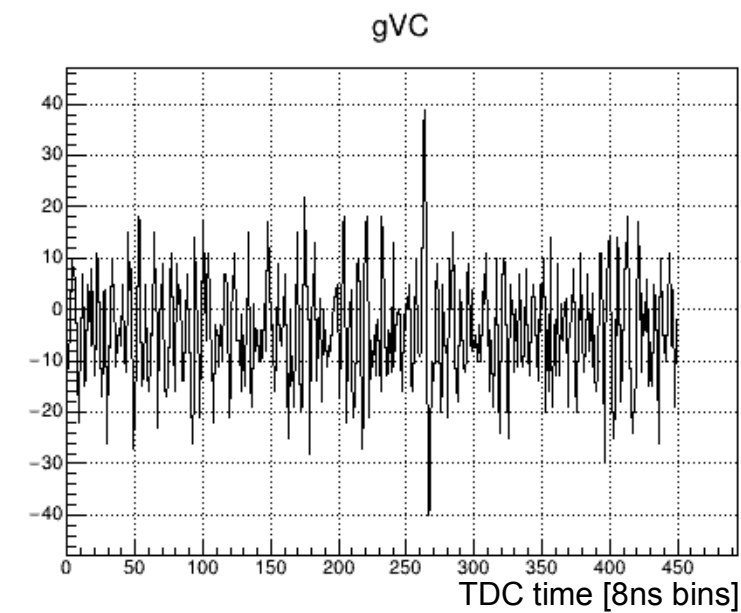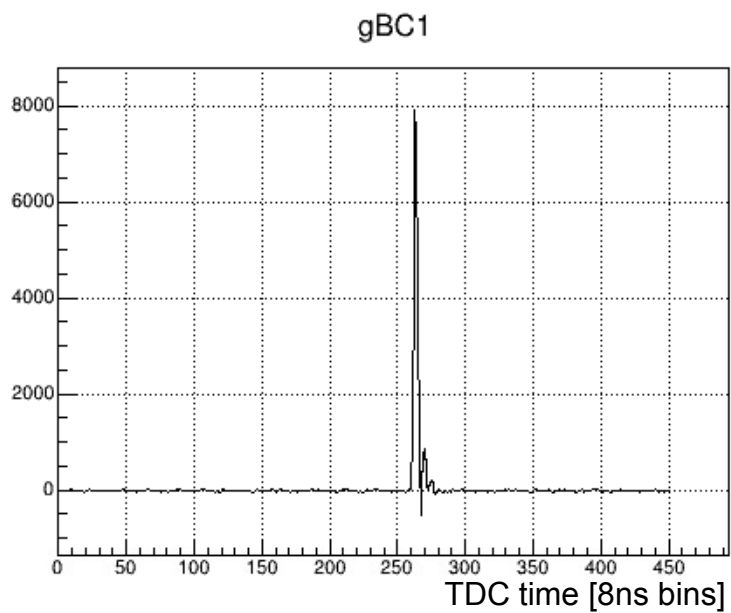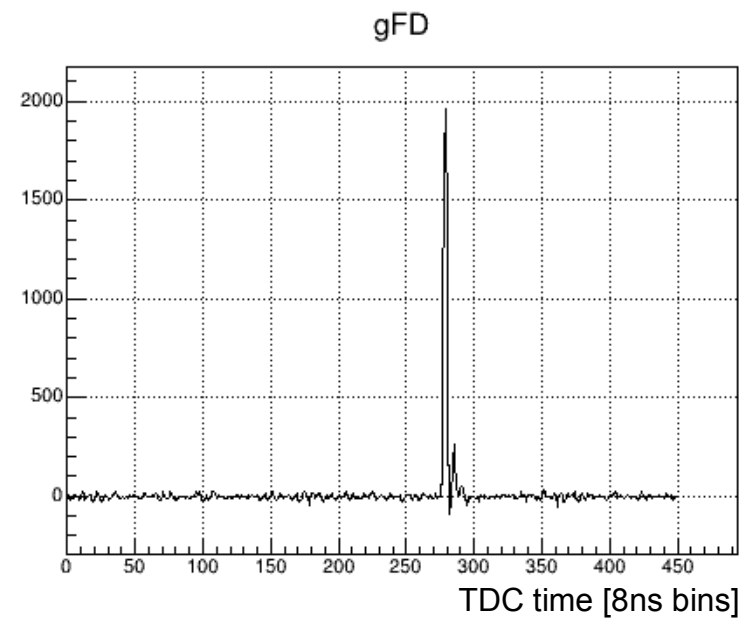new bmnroot experimental data production train

- Comparison of the charge distributions over the scintillation wall for the two energies at 3.0 and 3.8 GeV for the CCT2 trigger.
- The two cell types (small and big) are presented separately.

Multiplicity in ScWall vs Edep in FHCal
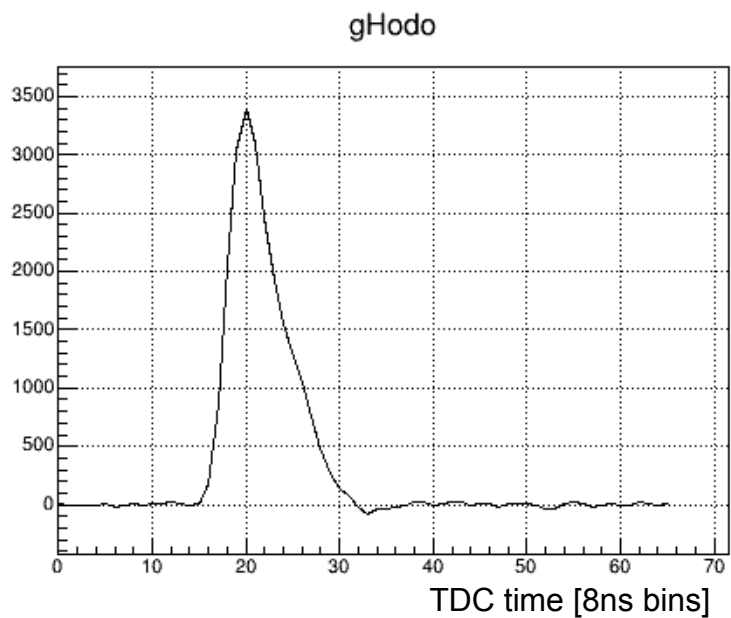
new bmnroot experimental data
production train

Cuts:
BC1S
Z^2 (ScWall) > 0.4
vertex Z (-1.5 < Z <1.5)
Z^2 (FQH) < 100

CCT2

1 ion in BC1S, normal event

gHodo

TDC time [8ns bins]

gFD

TDC time [8ns bins]

gBC1

TDC time [8ns bins]

gVC

TDC time [8ns bins]

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2 ions in BC1S, pile-up far from trigger

gHodo

gFD

gBC1

gVC

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2 ions in BC1S, pile-up after the trigger

interacted ion   gHodo   gFD

pile-up ion

TDC time [8ns bins]   TDC time [8ns bins]

gBC1   gVC

interacted ion   pile-up ion

TDC time [8ns bins]   TDC time [8ns bins]

15

2 ions in BC1S, pile-up before the trigger
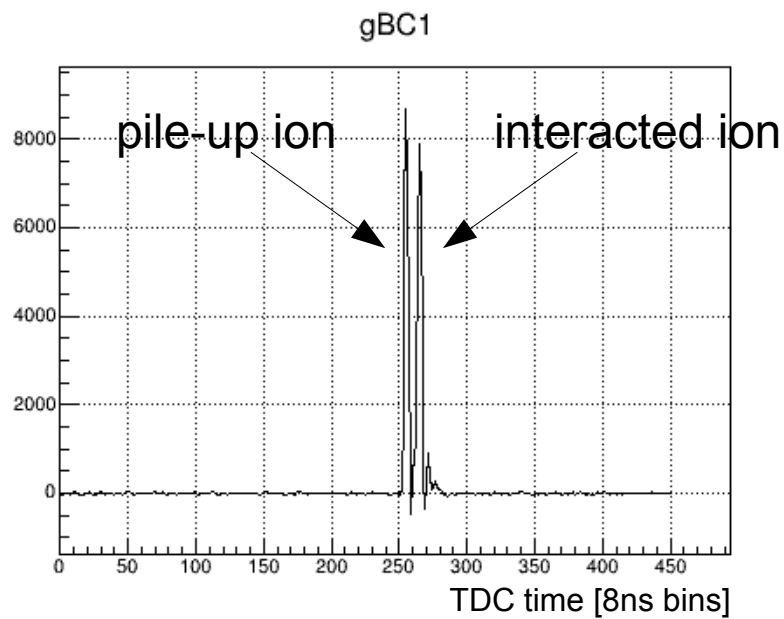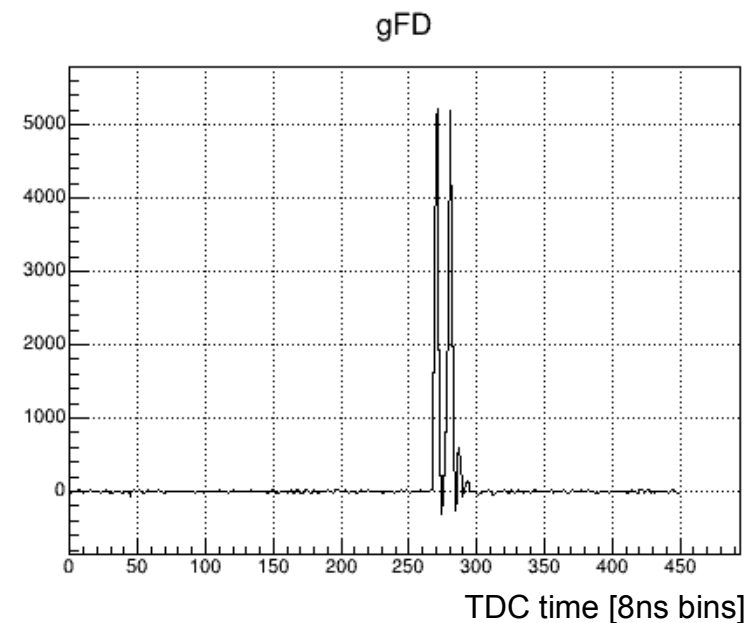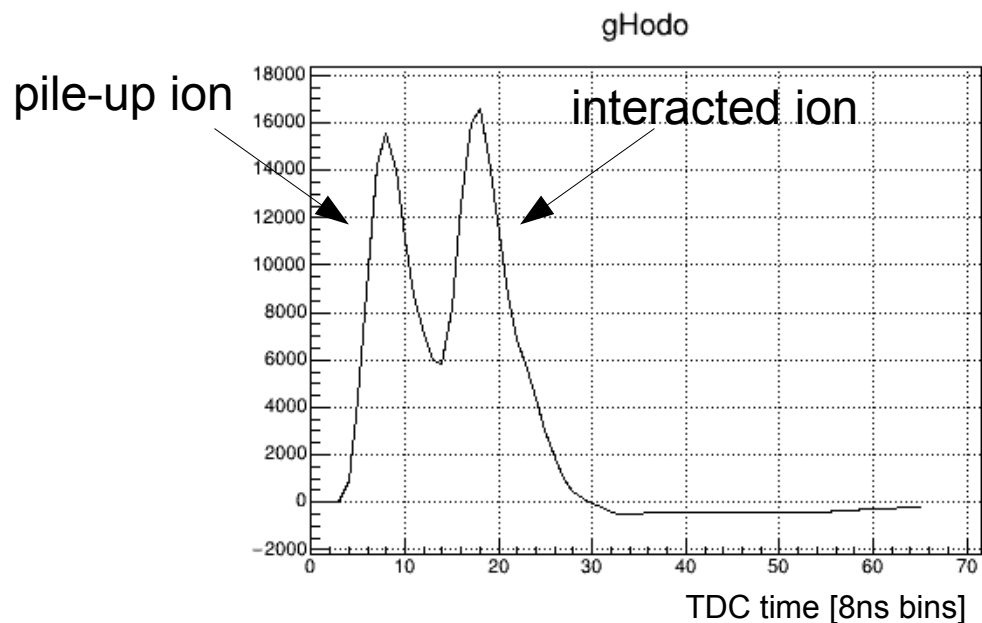
Summary:

- FHCal, FQH and ScWall have been used in run8 period of BM@N

- FHCal angle of rotation is fixed to have beam parallel to FHCal beam hole

- some failure channels in FHCal and ScWall has been fixed

- new reconstruction train has been tested, all spectra look the same

- pile-up analysis in Hodo detector is developing