

PDU Occupancy studies and status of ML-based PID for dRICH

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PDU occupancy study datasets

Datasets

Focusing on sector 1

1. Pion, 50 GeV/c, η - changing (1.5 - 3.5, 0.1 steps), ϕ - constant (90°), 100 events
2. Pion, 50 GeV/c, η - constant (1.7), ϕ - changing (55° - 130° , 5° steps), 100 events

dRICH geometry parameters

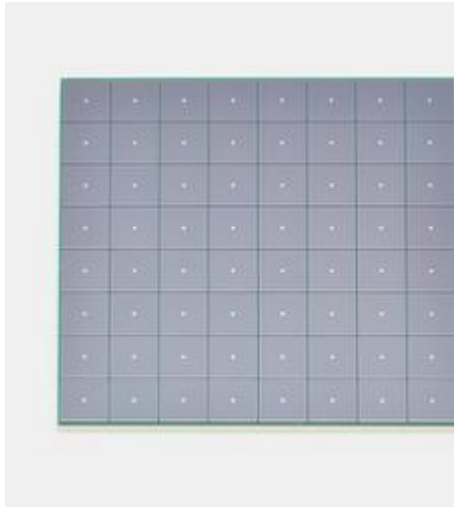
Total Sectors:6

PDU per sector: 210

Sensors per PDU: $2 \times 2 = 4$

Pixels(SiPMs) per sensor : $8 \times 8 = 64$

Total readout channels: 322,560 ; 53,760 per sector

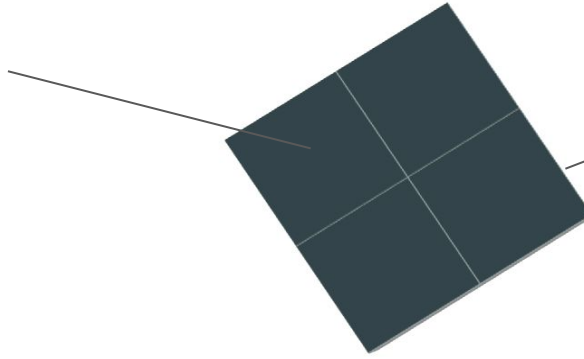


Sensor Model: S13361-3050NE-08 SiPM

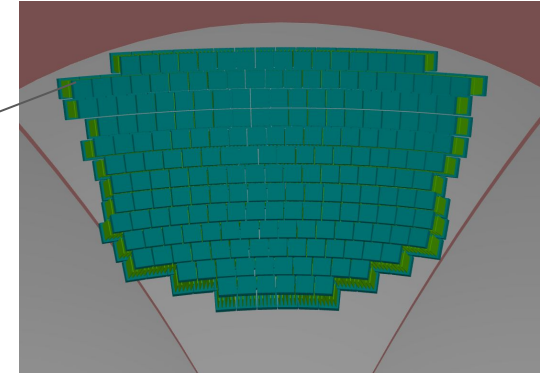
Size of each pixel = 3mm*3mm

Length of sensor = 25.8mm

Photosensitive surface thickness = 0.1mm



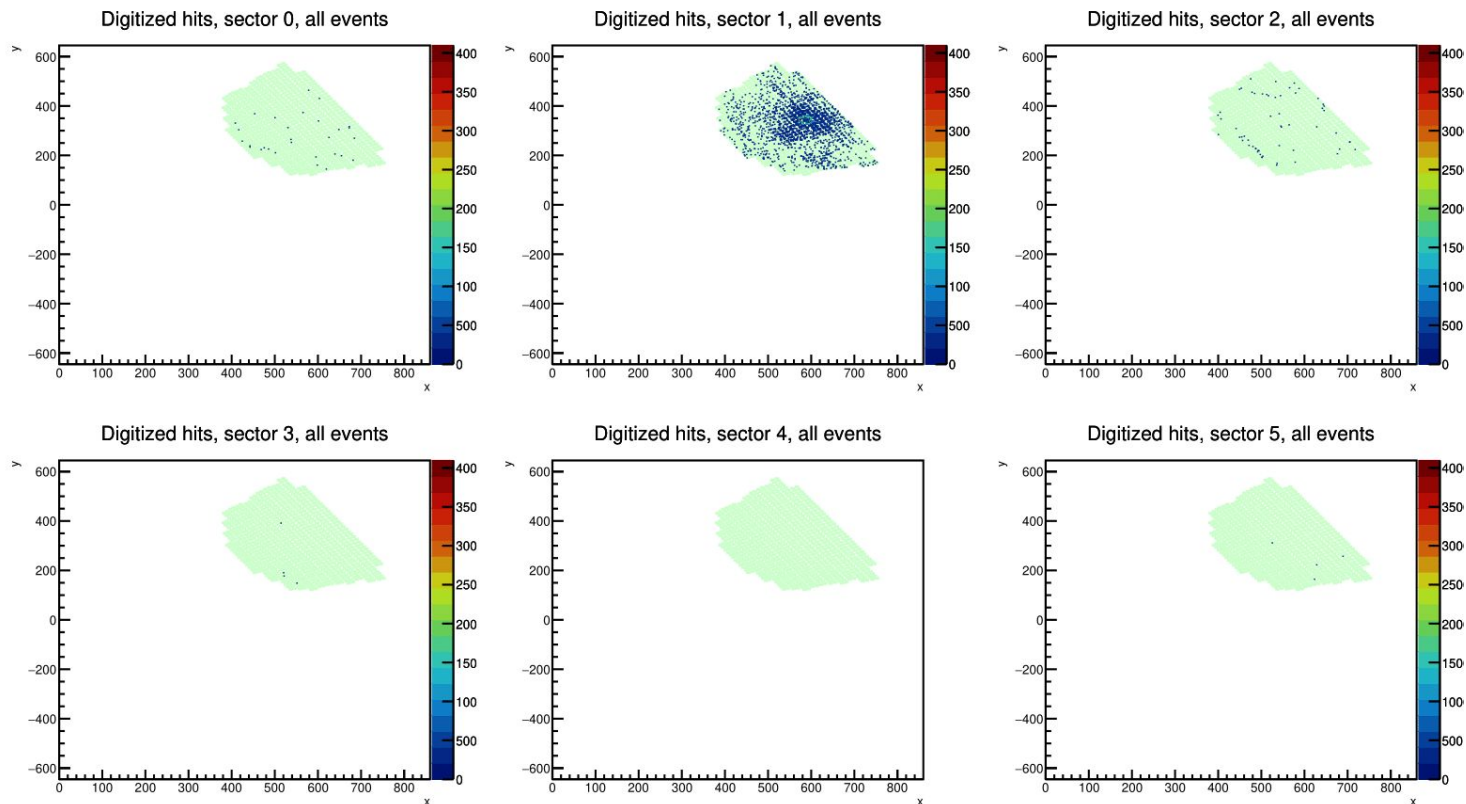
Photodetector Unit with 4 sensors



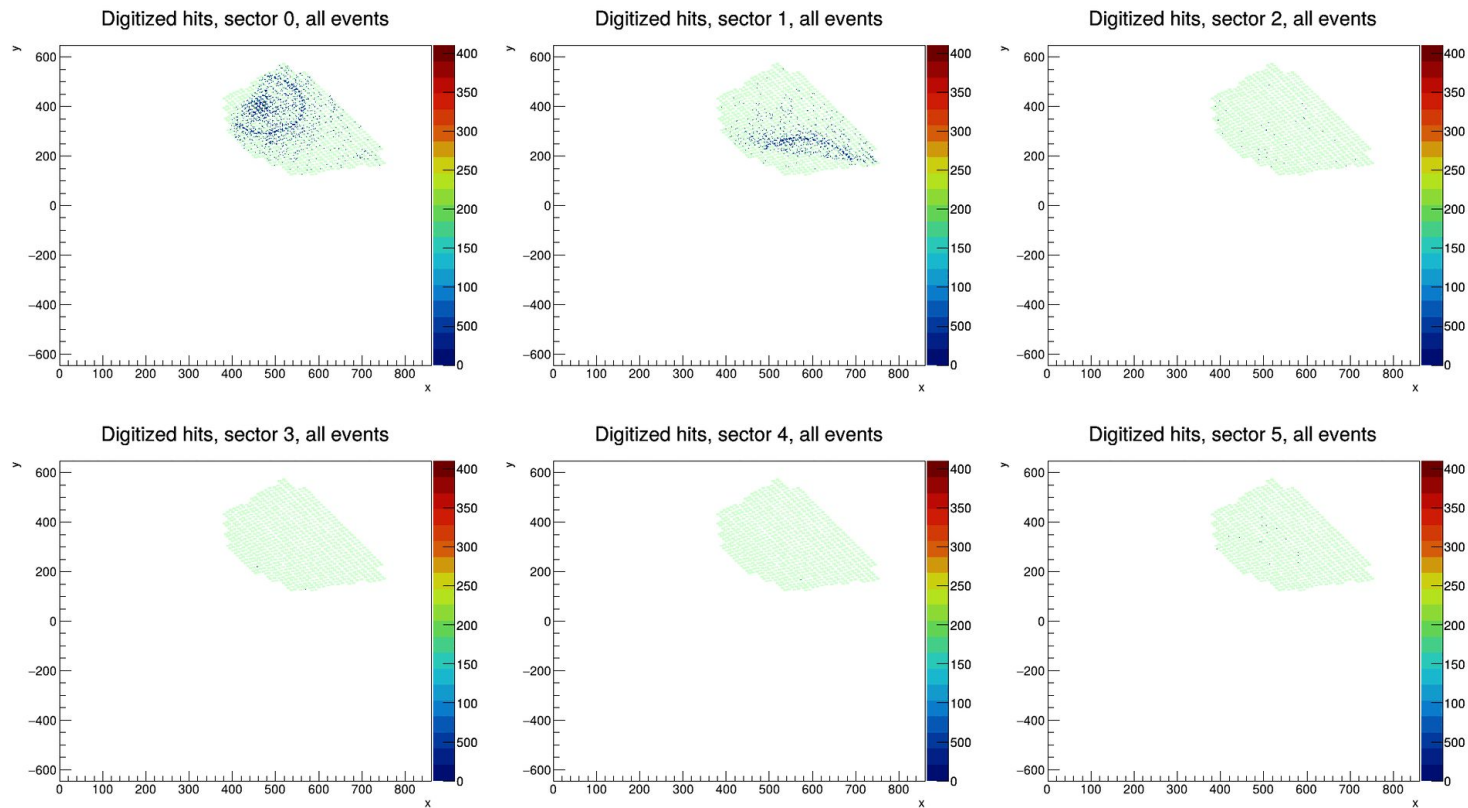
Sector

Credit :Girdish Laishram

η - changing (1.5 - 3.5, 0.5), ϕ - (constant 90°) **Dataset 1**

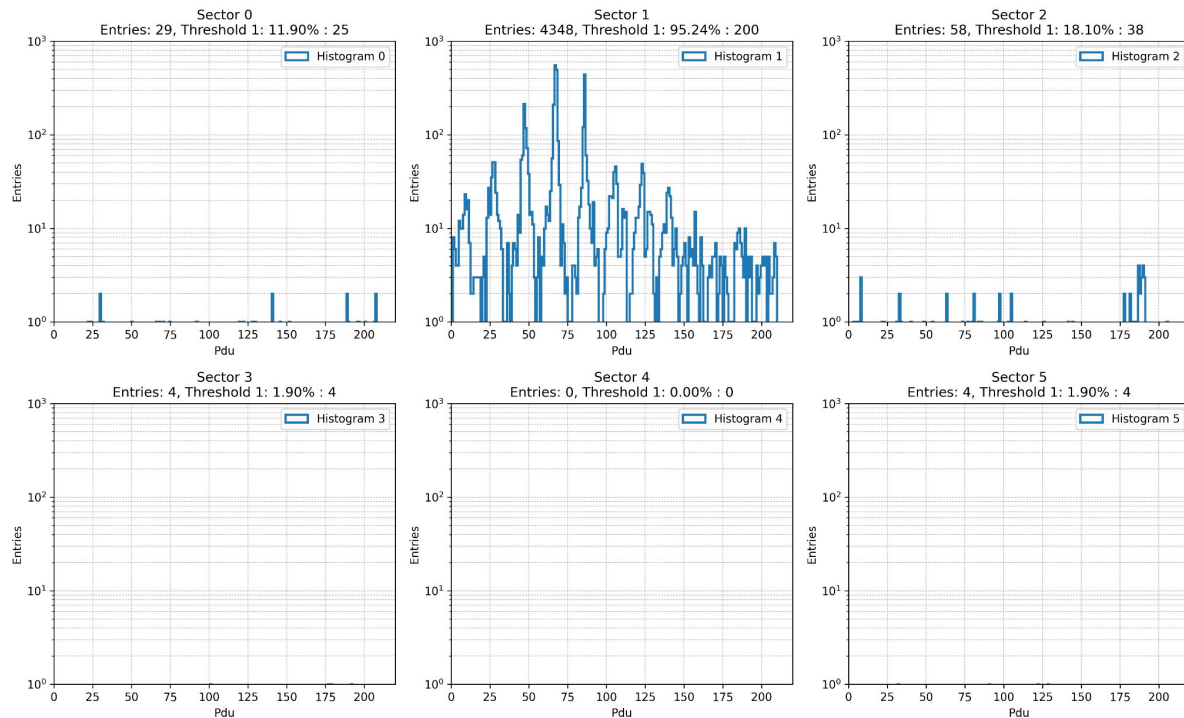


η - constant (1.7), ϕ - (55° - 130°, 5° steps) Dataset 2



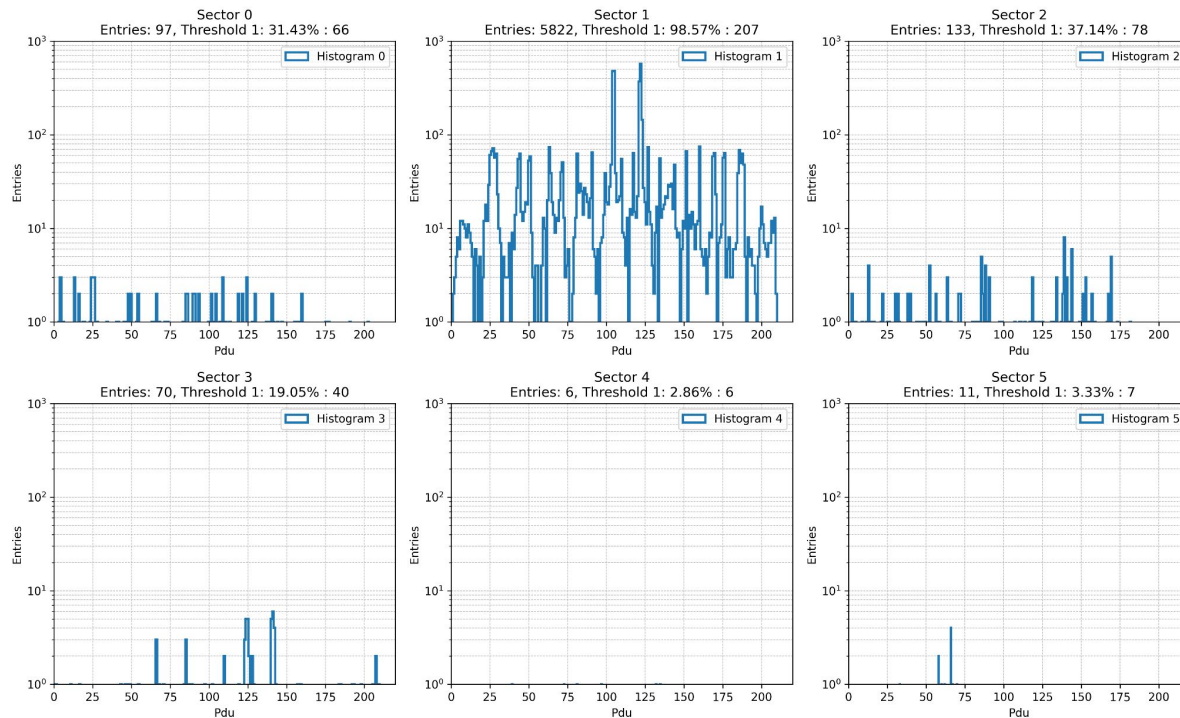
Occupancy plots for dataset 1, η - changing

Histogram 211_50_0_2 (Threshold: 1)



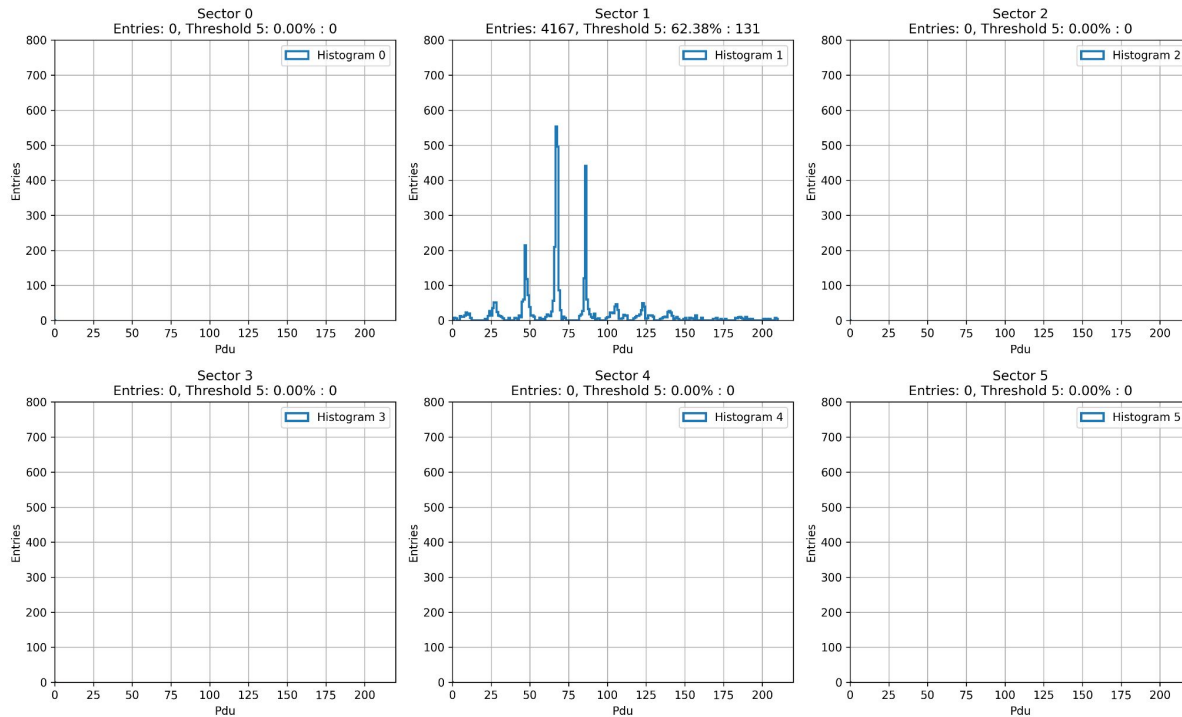
Occupancy plots for dataset 2, ϕ - changing

Histogram 211_50_2_18 (Threshold: 1)



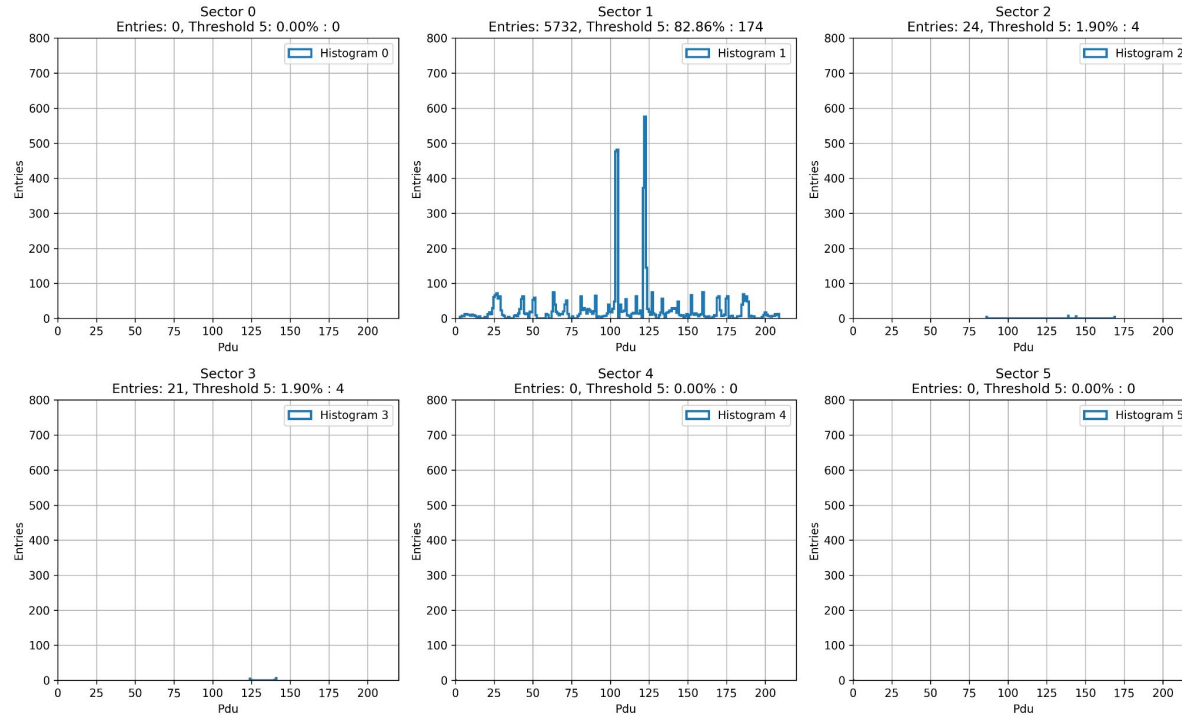
Threshold at 5 for dataset 1, η - changing

Histogram 211_50_0_2 (Threshold: 5)



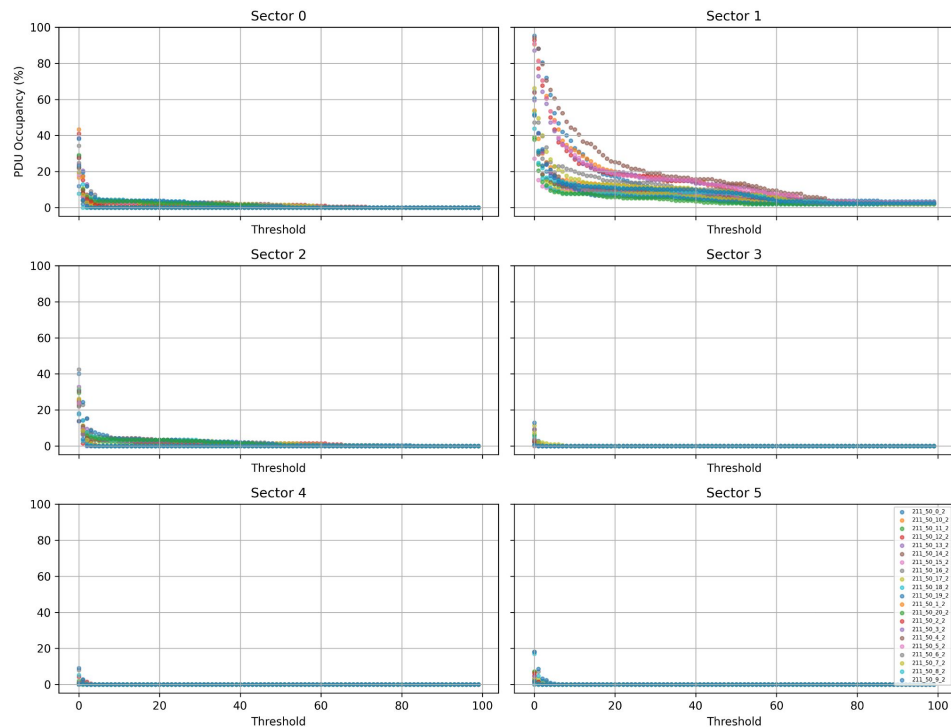
Threshold at 5 for dataset 2, ϕ - changing

Histogram 211_50_2_18 (Threshold: 5)



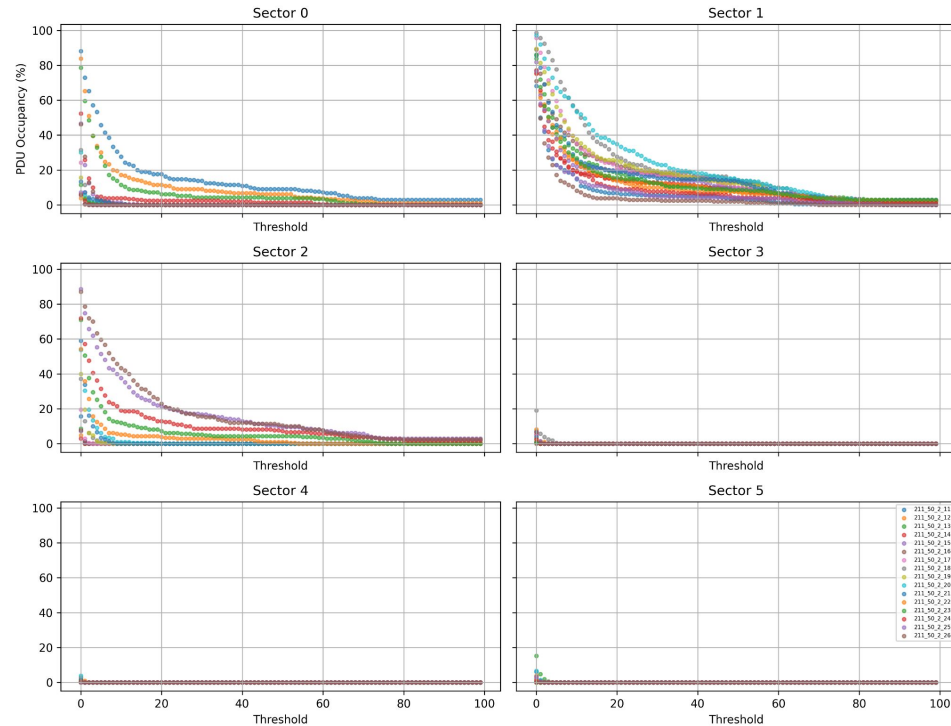
Threshold vs occupancy for dataset 1, η - changing

PDU Occupancy vs. Threshold

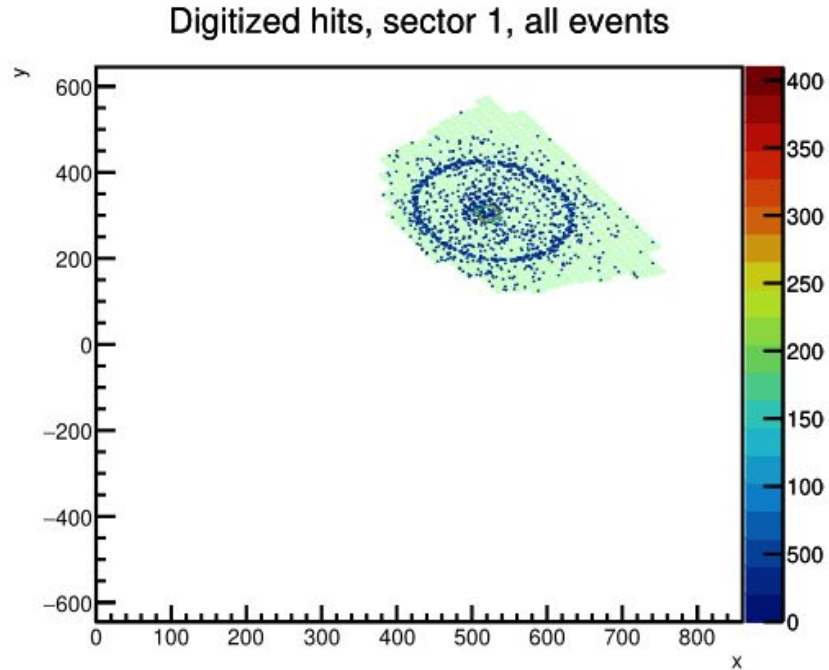


Threshold vs occupancy for dataset 2, ϕ - changing

PDU Occupancy vs. Threshold



ML-based PID for dRICH



ML-based PID for dRICH

Dataset

Events: 300,000

Particle: Pion, Kaon and Proton

Momentum: 2 - 52 GeV/c

η - 1.5 - 3.5

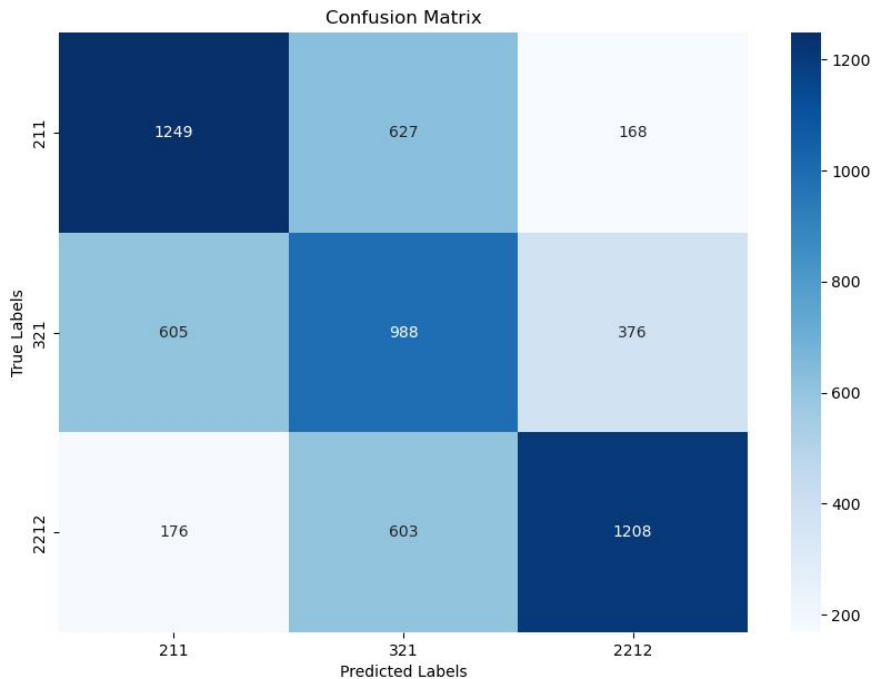
ϕ - 0 - 360

Test accuracy: 49 %

Features: mom_x, mom_y, mom_z, cellID

Label: PDG

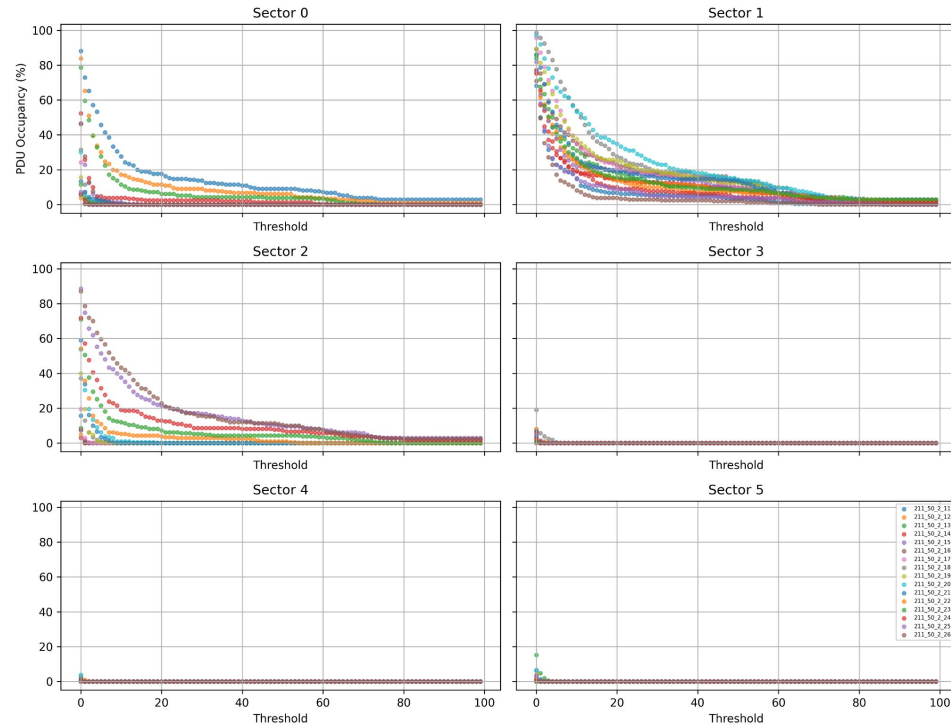
ML-based PID for dRICH - confusion matrix



RESERVE PLOTS

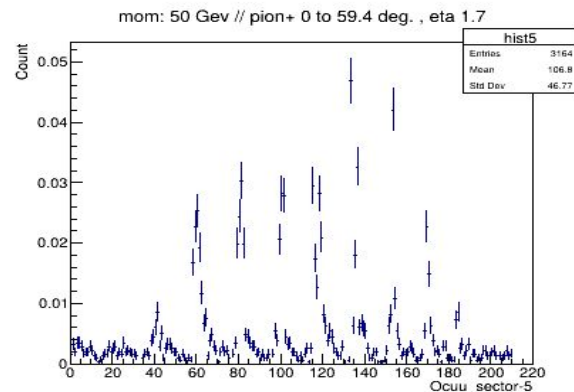
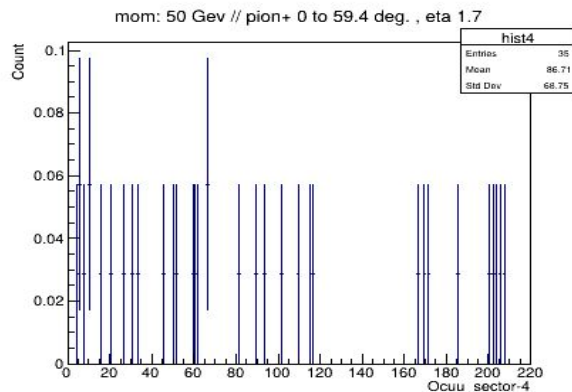
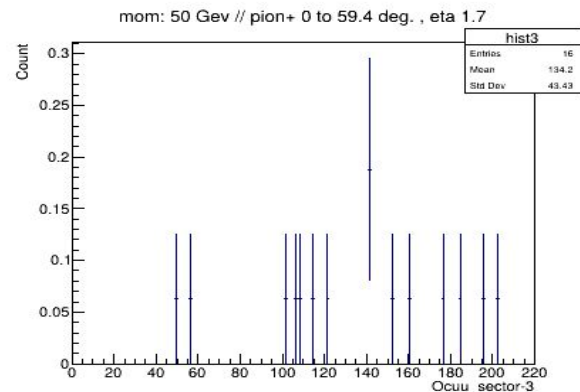
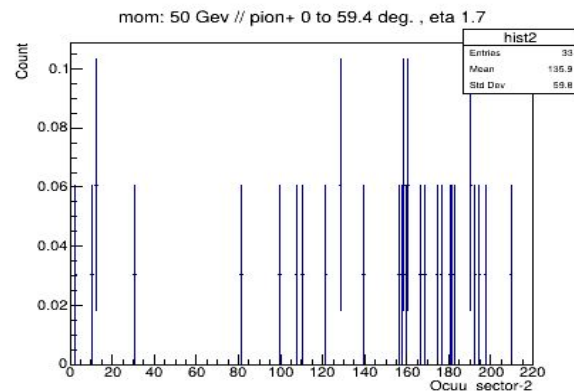
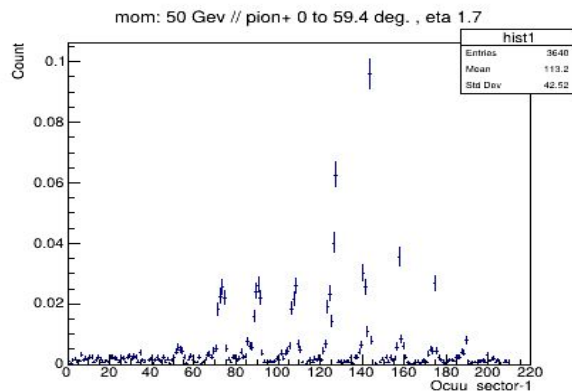
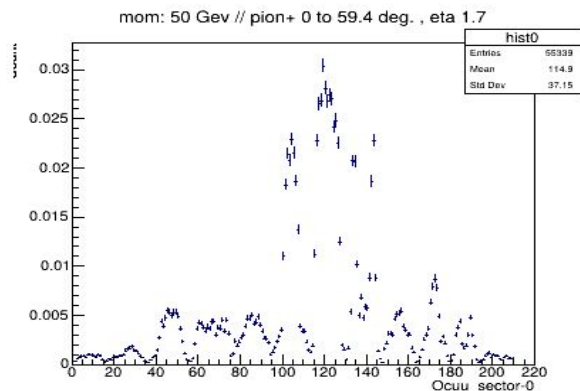
Threshold vs occupancy for dataset 1, η - changing

PDU Occupancy vs. Threshold

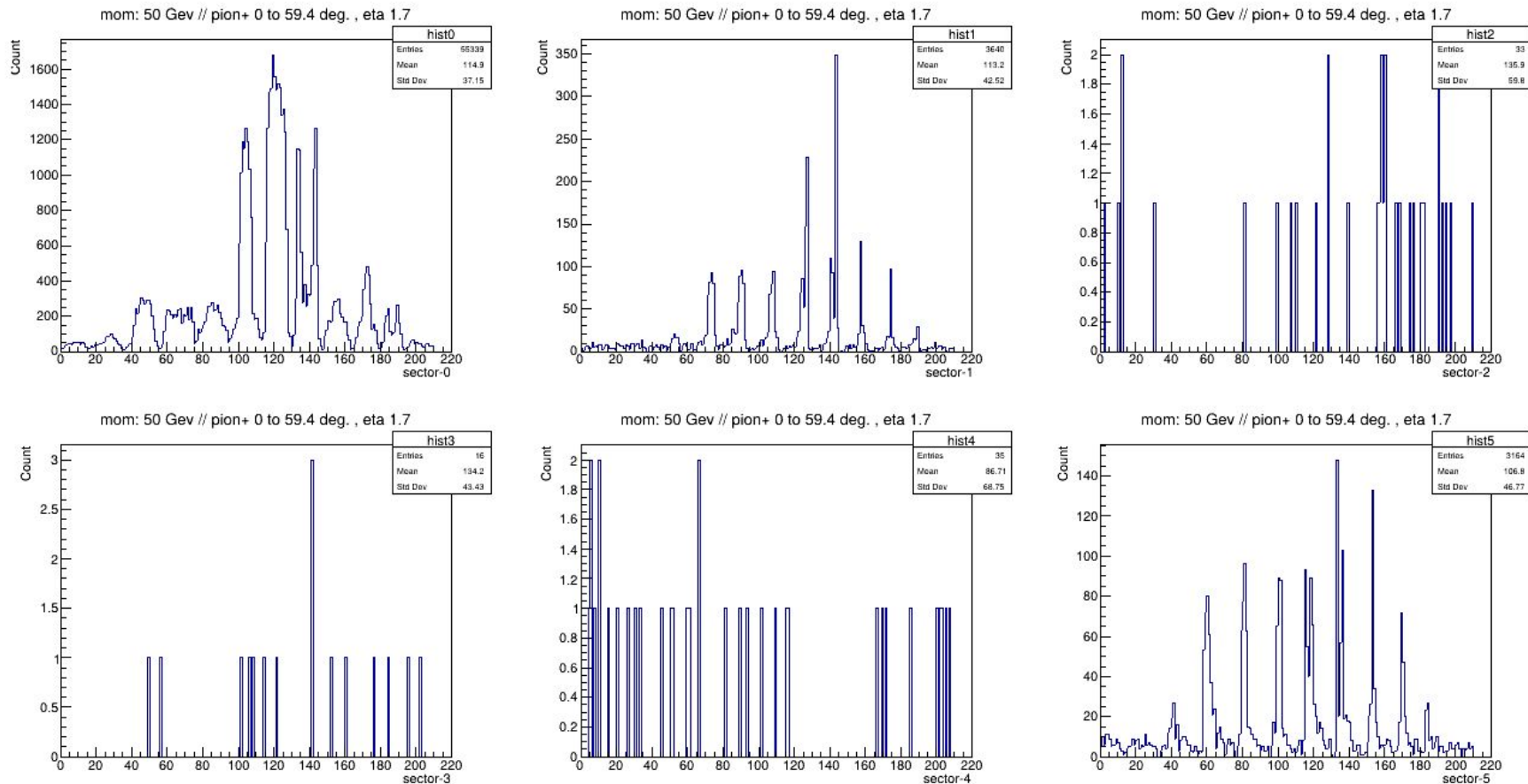


Cover only sector 0 , 100 event

I've cover 0 to 59.4 deg. , at fixed eta 1.7 (Make edit in text)



Hist of the previous one



Hit- map of previous one(center : 33.9426 deg.|| 1.7 eta) to make sure the centre
(please make edit, if this aren't relevant remove them)

