FCAL bad channels GlueX data

Susan Schadmand, 25.Nov.2020

introduction

- FCAL bad channel maps needed for efficiency from simulations
    - main issue: HV stability

- NIM paper:
    - four acrylic panes each covering the upstream end of one quadrant
    - each pane is illuminated by forty LEDs, ten violet, ten blue, and twenty green
    - the different colors are used to study the wavelength dependence of the transmission
    - transmission of blue is sensitive to radiation damage which causes brownish color of lead glass

- WIKI:
    - during production running the FCAL LEDs are cycled through 6 configurations, each 10 minutes long and tied to the wall clock

        Violet 12 V   (00 to 09 minutes)
        Blue   10 V   (10 to 19 minutes)
        Green 29 V   (20 to 29 minutes)
        Violet 22 V   (30 to 39 minutes)
        Blue   15 V   (40 to 49 minutes)
        No pulsing   (50 to 59 minutes)

- goal: "efficiencies" per run per detector channel, based on Blue 15 V
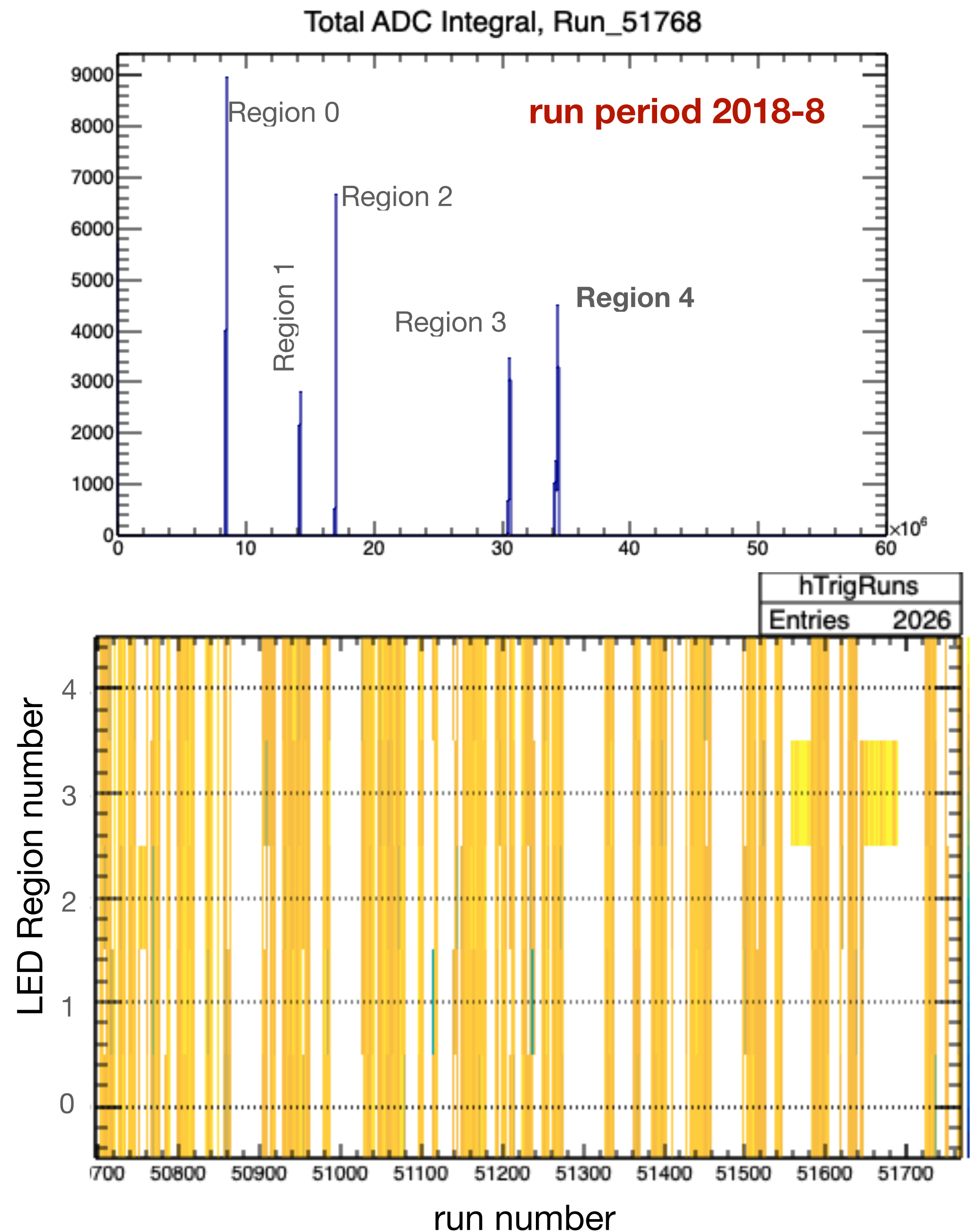   - with respect to HV status only

analysis of LED skims

- plugin for histograms (hd_root file) containing ADC integrals per detector channel
  - */u/home/susansch/GlueX/halld_my/plugins/ fcalbadchannels*

- scripts for analysis
  - */u/home/susansch/GlueX/FCAL/badchannels/ RunPeriod-2018-08*

- sum over ADC integrals shows distinct peaks for the different "LED Regions"
  - *Regions 0-4, Region 4 is 'most intense color'*

- LEDs are cycled, LED trigger sometimes off (by choice)

  see 2D plot:
  Entries in LED Regions
  as a function of LED Region and run number

RunPeriod 2018-08 physics runs: 050697 - 051768

Total ADC Integral, Run_51768

Region 0
Region 1
Region 2
Region 3
Region 4
run period 2018-8

hTrigRuns
Entries   2026

LED Region number

run number

3

evaluation of histograms

- scripts for running the macro
  - */u/home/susansch/GlueX/FCAL/badchannels/macros/ChannelStatusGlueX.C*

- Entries: entries of histograms, ADC integrals per detector channel, normalized via entries in LED Region
  - just entries, no regard to number or quality of peaks in histograms

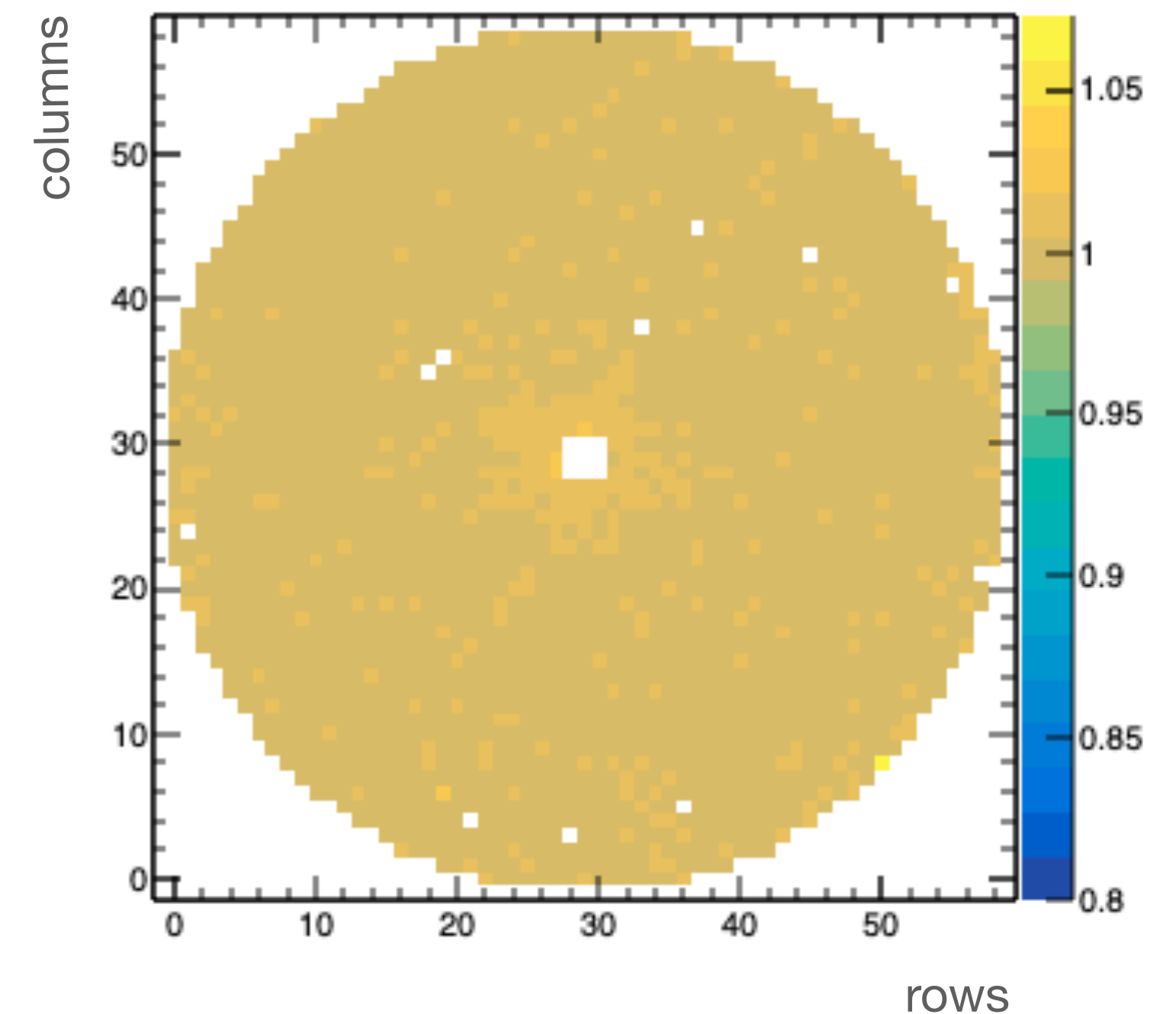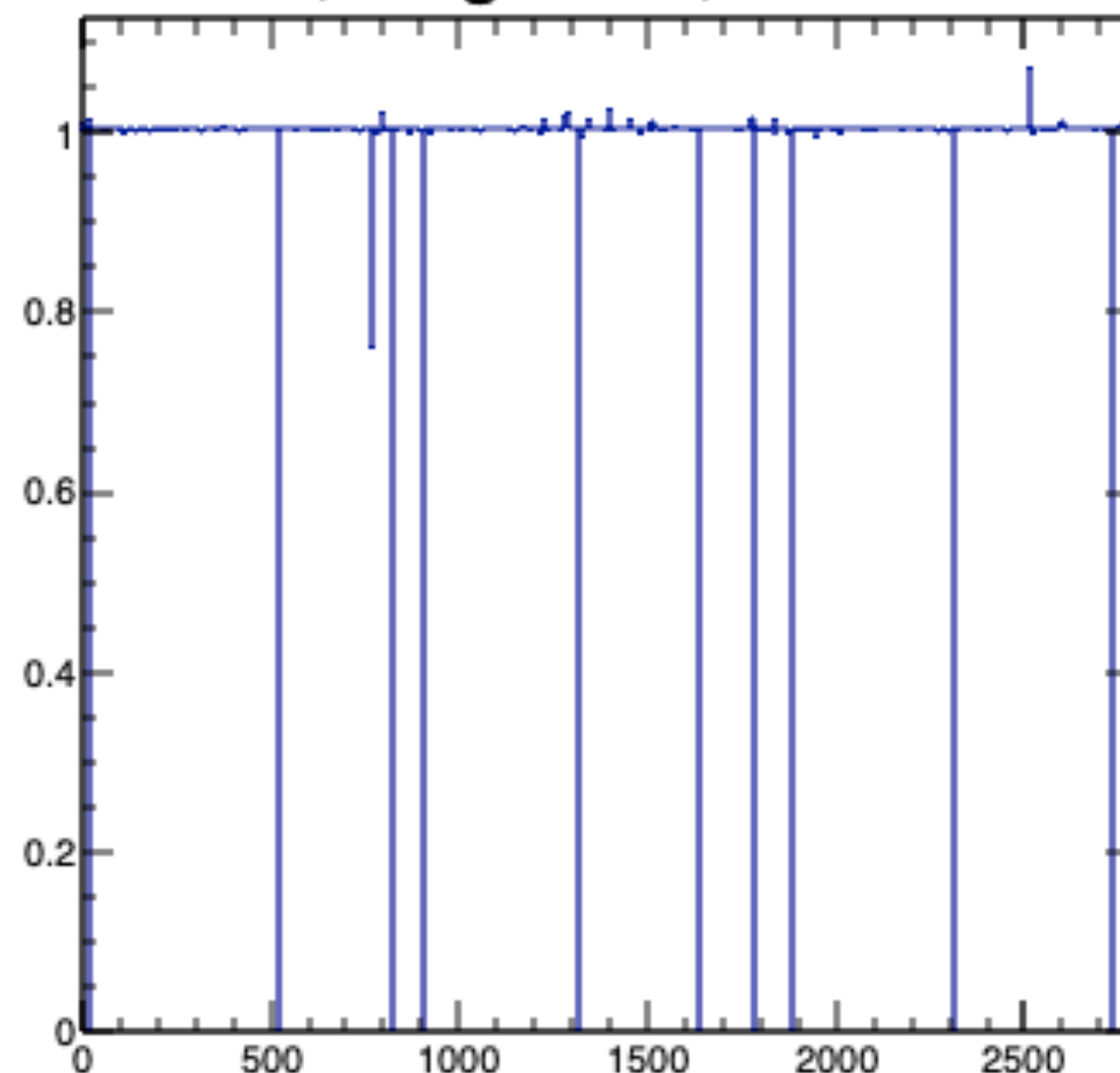- txt output file: Entries>1 are set to 1 —> "**efficiency"** (with respect to HV status)

- Entries plot is using the translation
  int channel =
     fcalGeom.channel(digihit->row,digihit->column);

- 2D plot is the occupancy
  hRowColOcc_[ireg]->Fill(digihit->row,digihit->column);

  normalized to the Entries plot

  (Run_051768 is last physics production run)

Entries, Region_4, Run_51768

output files for data base

- a root file with entry and occupancy plots

- txt files: "efficiencies"
  - with respect to HV status only
  - per run and per LED Region,
  - each file <u>2800 lines, 1 column</u>

/w/halld-scifs17exp/home/susansch/FCALbadchannels

```
Run_051599_Entries_plot.root
Run_051599_Region0_Eff.txt
Run_051599_Region1_Eff.txt
Run_051599_Region2_Eff.txt
Run_051599_Region3_Eff.txt
Run_051599_Region4_Eff.txt
```