Simulation of Bad Channels in Calorimeters Implementation for PrimEx

Production and Analysis Meeting

A. Somov, July 29, 2020
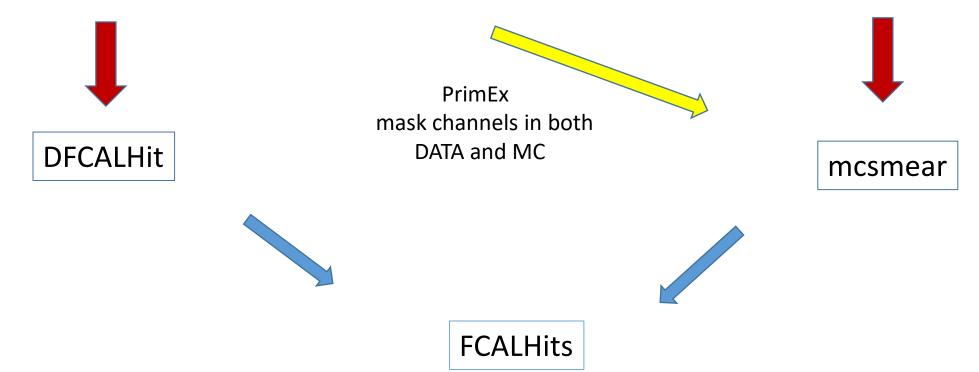
Simulation of Bad Channels in FCAL

Data

Monte Carlo

CCDB **block_quality**
contains suspicious (and dead) channels
run-by-run masks for PrimEx,
many unstable channels

CCDB **block_mc_efficiency**
Compute efficiencies by averaging over many runs

PrimEx
mask channels in both
DATA and MC

DFCALHit

mcsmear

FCALHits

Effiency table block_mc_efficiency

- **Channel efficiency is computed by averaging channel performance over many runs**

  - in MC each each hit is excluded from the reconstruction (DFCALHit table) based on the average efficiency

  - in general this approach is not correct, time correlations are neglected

- **PrimEx implementation:**

  - identify a list of bad and suspicious channels for every run, write them to the block_quality table

    - the number of suspicious channels changes over different runs (missed base communications, HV voltage drops, etc)
    - about two hundred channels with some possible problems during PrimEx run
              (see Chandra's talk at the collaboration meeting)

  - exclude suspicious channels from both Data and MC for every run

  - some efficiency corrections can be applied later (if needed) using block_mc_efficiency table

Channel Efficiency (block_mc_efficiency) for GlueX

- FCAL MC efficiencies have not been updated for GlueX runs since 2017

Efficiencies 'frozen' in the end of 2017

```
/FCAL> ls block_mc_efficiency
/FCAL/block_mc_efficiency
(ID)     (Created)               (Modified)              (variation)   (run range)       (comments)               blk_eff
                                                                                                                  double
297949   2020-07-26 17-11-19     2020-07-26 17-11-19     mc            60921L-69999L      PrimEx Phase I
297948   2020-07-26 17-09-41     2020-07-26 17-09-41     mc            60921L-69999L                              0.999605
297947   2020-07-26 17-08-30     2020-07-26 17-08-30     mc            60921L-69999L                              0.58124
94479    2017-12-13 15-18-58     2017-12-13 15-18-58     mc            30999L-inf         efficiency              0.988287
94478    2017-12-13 15-18-57     2017-12-13 15-18-57     mc            30929L-30998L      efficiency              0.895341
94477    2017-12-13 15-18-56     2017-12-13 15-18-56     mc            30842L-30928L      efficiency              0.997801
94476    2017-12-13 15-18-55     2017-12-13 15-18-55     mc            30808L-30841L      efficiency              0.999584
94475    2017-12-13 15-18-54     2017-12-13 15-18-54     mc            30789L-30807L      efficiency              0.999555
94474    2017-12-13 15-18-53     2017-12-13 15-18-53     mc            30742L-30788L      efficiency              0.998871
94473    2017-12-13 15-18-52     2017-12-13 15-18-52     mc            30683L-30741L      efficiency              0.999437
94472    2017-12-13 15-18-51     2017-12-13 15-18-51     mc            30649L-30682L      efficiency              0.984739
94471    2017-12-13 15-18-50     2017-12-13 15-18-50     mc            30613L-30648L      efficiency              0.617188
94470    2017-12-13 15-18-49     2017-12-13 15-18-49     mc            30572L-30612L      efficiency              0.985525
94469    2017-12-13 15-18-48     2017-12-13 15-18-48     mc            30470L-30571L      efficiency              0.999603
94468    2017-12-13 15-18-47     2017-12-13 15-18-47     mc            30435L-30469L      efficiency              0.999658
94467    2017-12-13 15-18-46     2017-12-13 15-18-46     mc            30388L-30434L      efficiency              0.999455
94466    2017-12-13 15-18-45     2017-12-13 15-18-45     mc            30332L-30387L      efficiency              0.999609
94465    2017-12-13 15-18-44     2017-12-13 15-18-44     mc            11556L-30331L      efficiency              0.999204
94464    2017-12-13 15-18-44     2017-12-13 15-18-44     mc            10331L-11555L      efficiency Average 2    0.712814
14830    2016-07-13 16-40-43     2016-07-13 16-40-43     default       0L-inf                                    0.999672
                                                                                                                  -More--
```

- Efficiencies for some channels are significantly smaller than 100 %
- FCAL had problems with a lot of channels since 2017 (more than 100 bases have been replaced)

Channel Efficiency (block_mc_efficiency) for GlueX

- BCAL MC efficiencies have not been updated for GlueX runs since 2017

- BCAL has better performance than FCAL
  - however there were some runs with problems with FADCs, etc.

- Default efficiencies are set to 1

```
/BCAL/channel_mc_efficiency
(ID)    (Created)             (Modified)             (variation)    (run range)    (comments)
81821   2017-07-13 10-28-36   2017-07-13 10-28-36    mc             11366-11663    Date: 2017-07-13
81820   2017-07-13 10-25-46   2017-07-13 10-25-46    mc             30274-31057    Date: 2017-07-13
14834   2016-07-13 16-40-48   2016-07-13 16-40-48    default        0-inf
```