Software update

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DigiSim updates

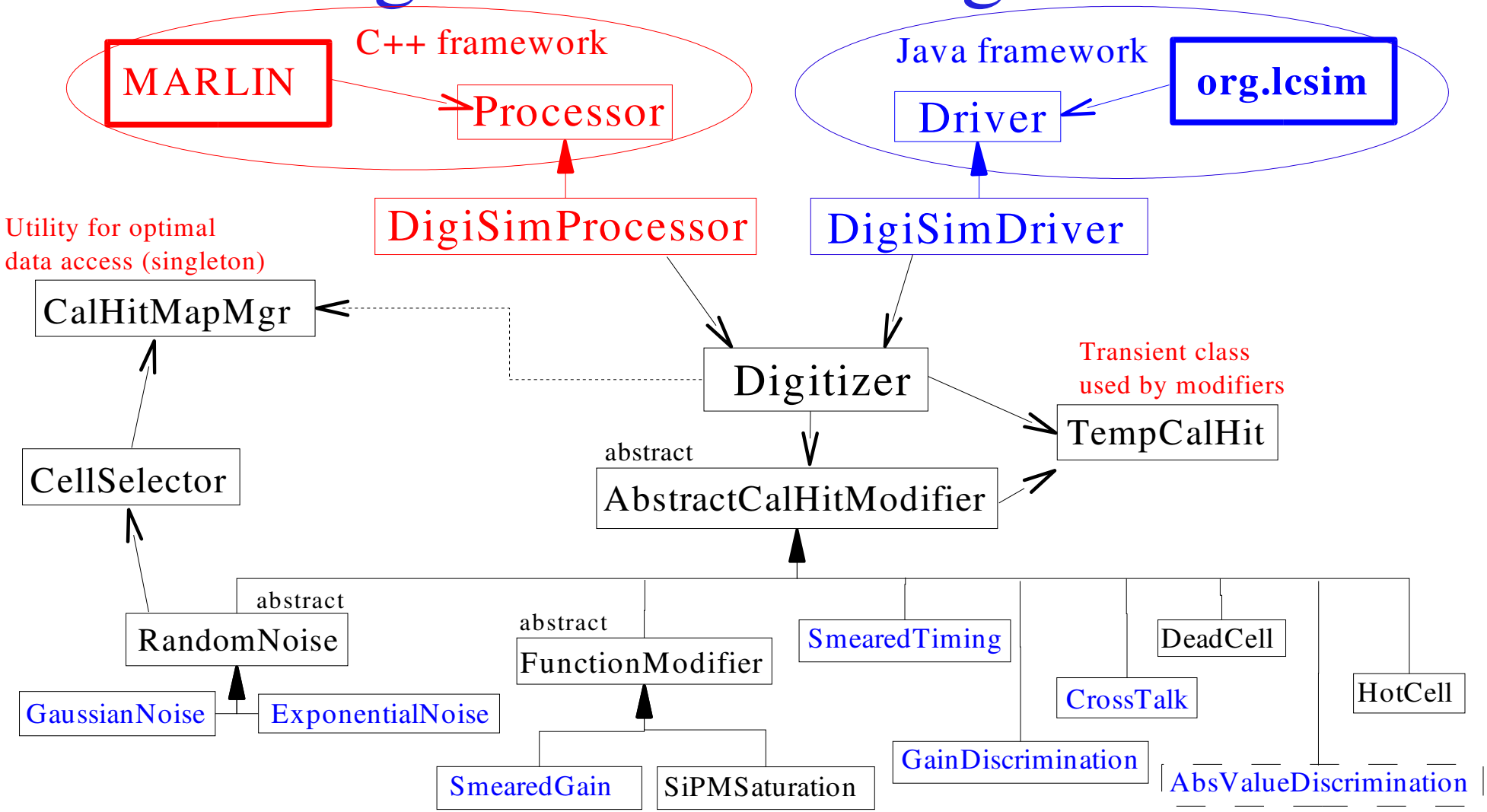
- New modifiers implemented: Crosstalk, GaussianNoise, ExponentialNoise, AbsValueDiscrimination (under tests)

```
# Crosstalk                                  mean    sigma
HBcrosstalk      Crosstalk                   0.07     0.01

### Noise generators
# GaussNoise parameters:        sys   be    Ecut   TimeNom  TSig   Mean  Sigma
# Note: sigma<0 means that threshold acts on absolute values (keep large negs)
HBGaussNoise   GaussianNoise      3     0      7       100   100    0.0  -1.6
# ExponentialNoise parameters:  sys    be   Ecut   TimeNom  TSig   Mean
HBExpoNoise    ExponentialNoise   3     0      7       100   100    0.6

# Discrimination                          gainNom  gainSig threshNom  threshSig
#HBdiscrim   AbsValueDiscrimination                              8         1
HBdiscrim    GainDiscrimination              1        0         8         1
```

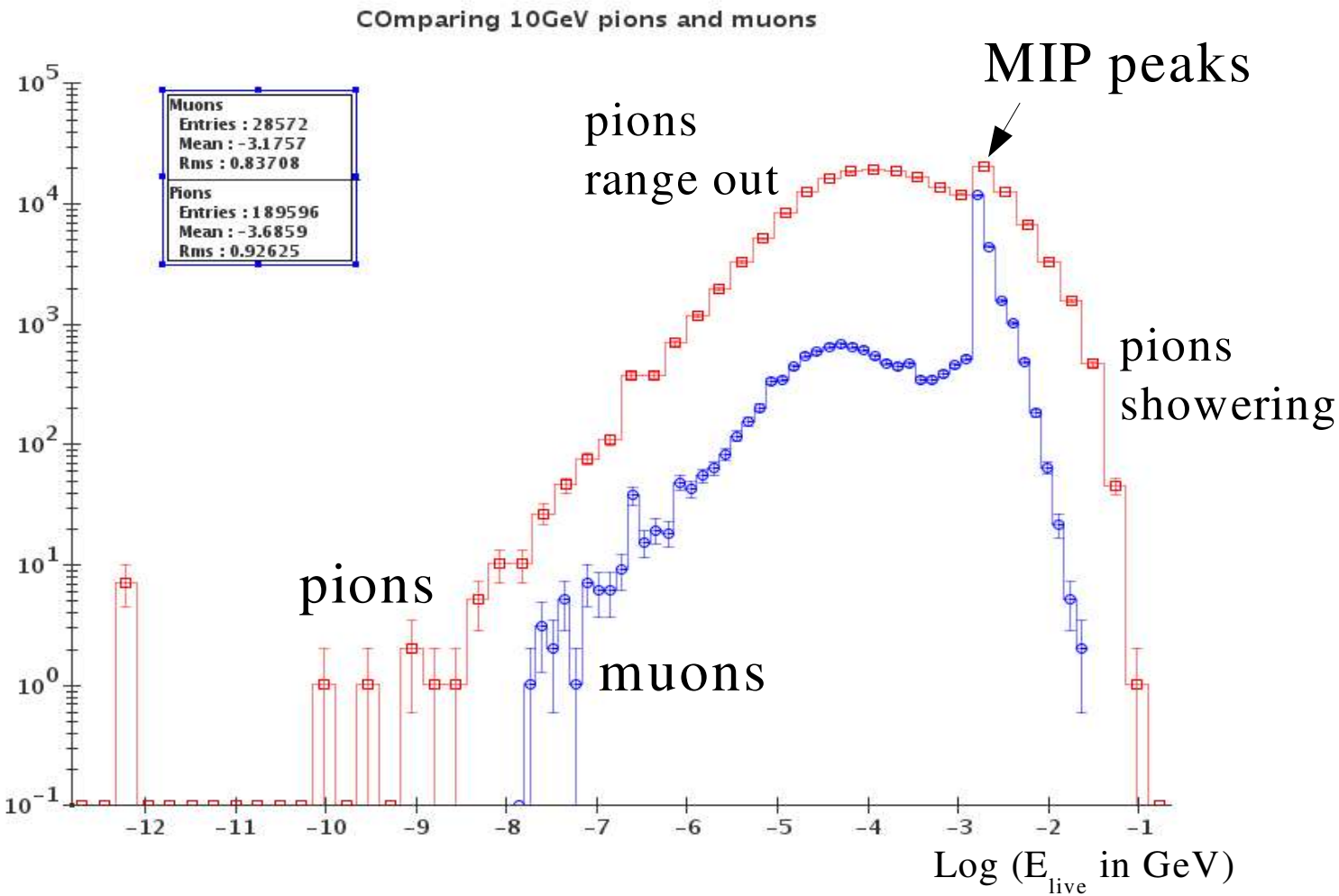
Where system: 2 = ECal, 3 = Hcal and barrel/endcap= 0,1,2 for barrel, ECN, ECS.
Ecut (noise modifiers) just affects noise-only cells.

Question: Are these parameters appropriate? Any suggestions?

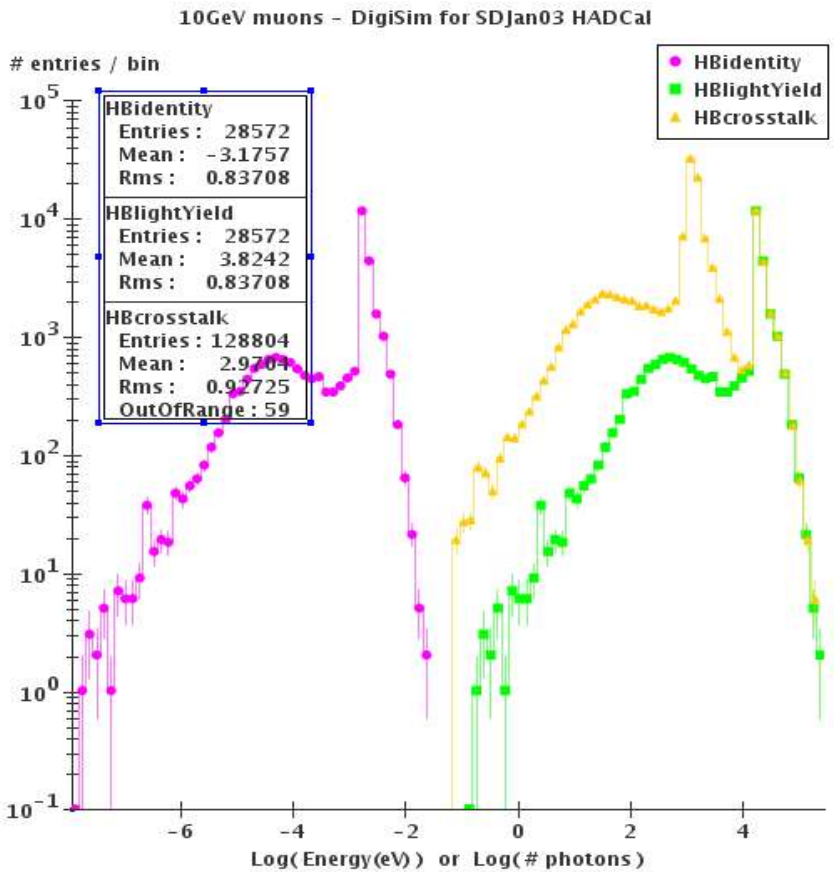
DigiSim class diagrams

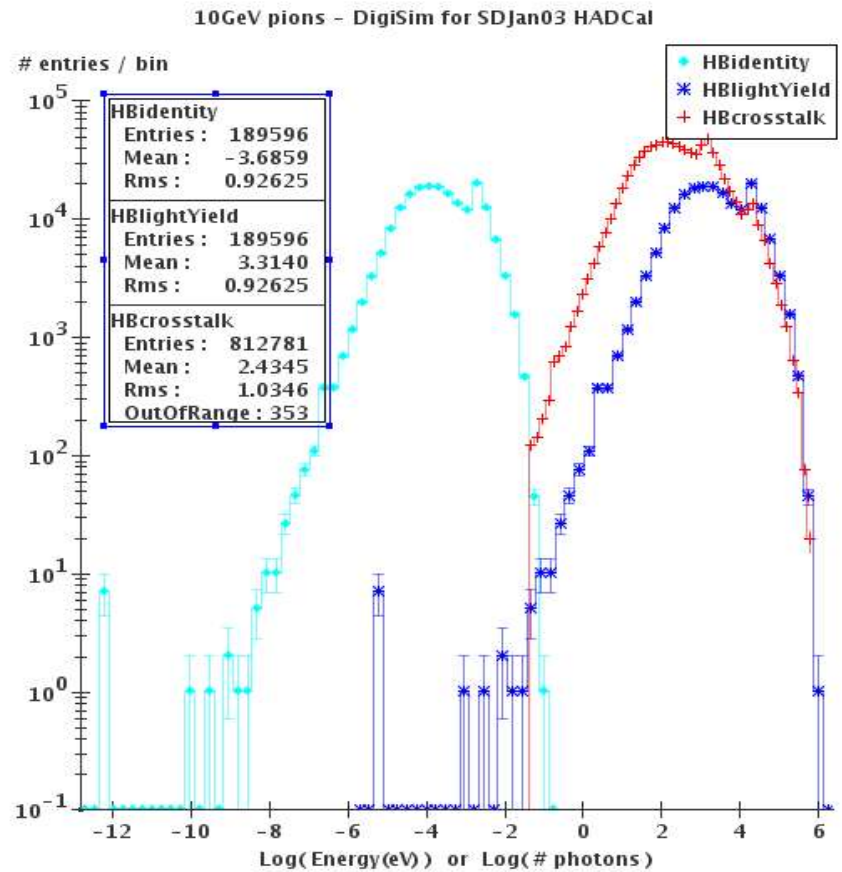


Comparing 10 GeV pions and muons

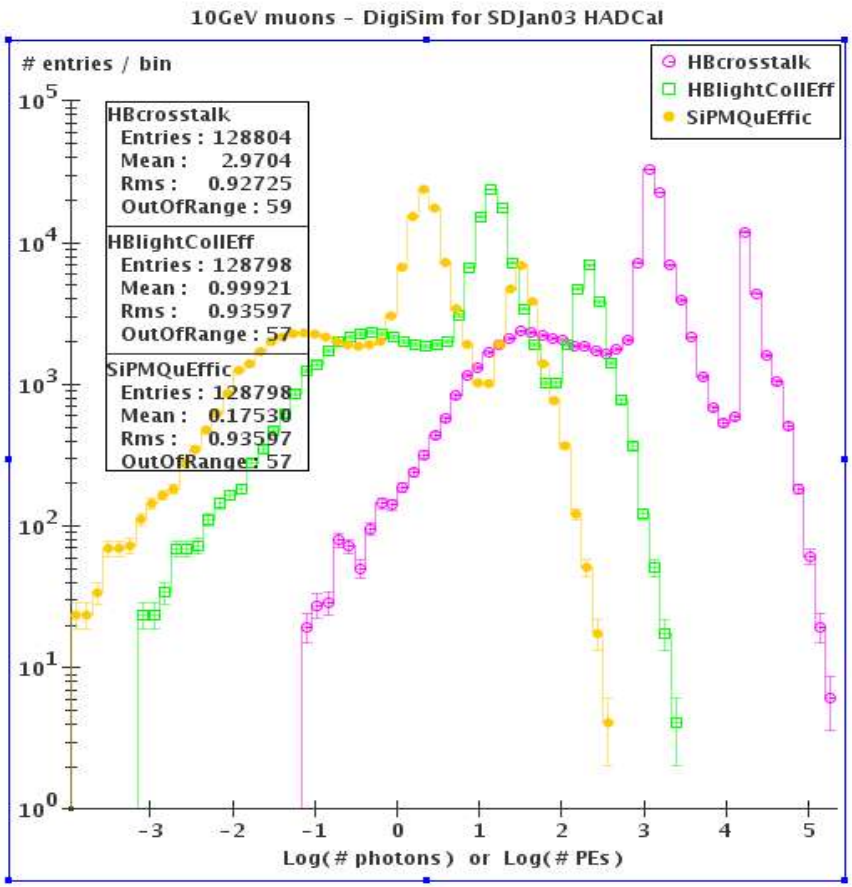


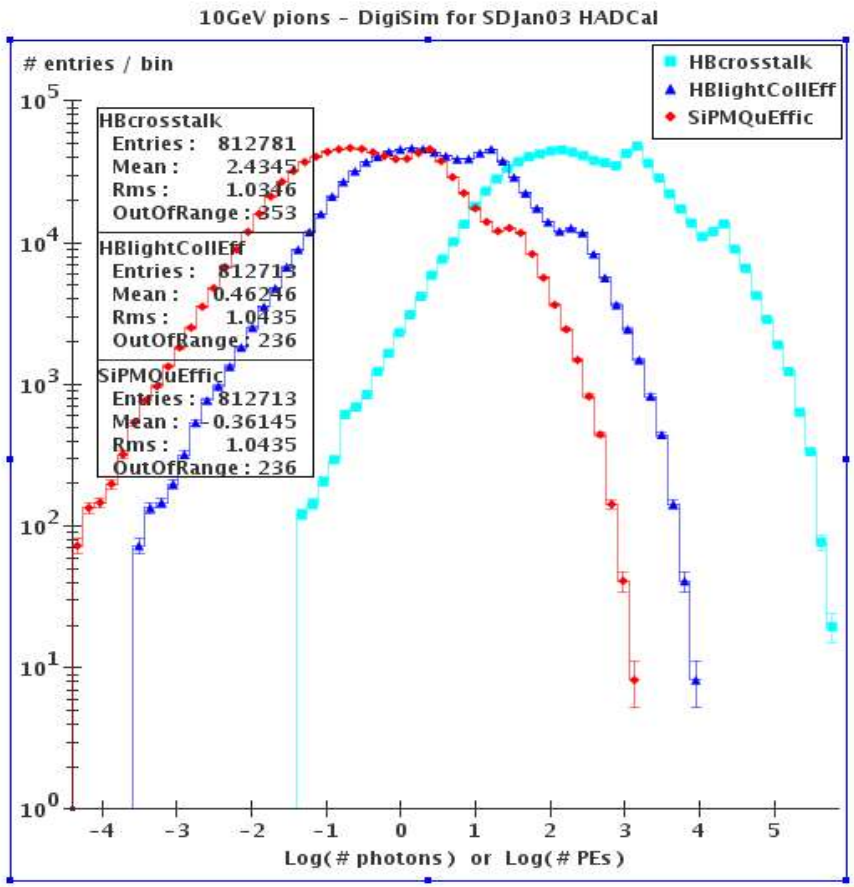
Scintillation and light crosstalk



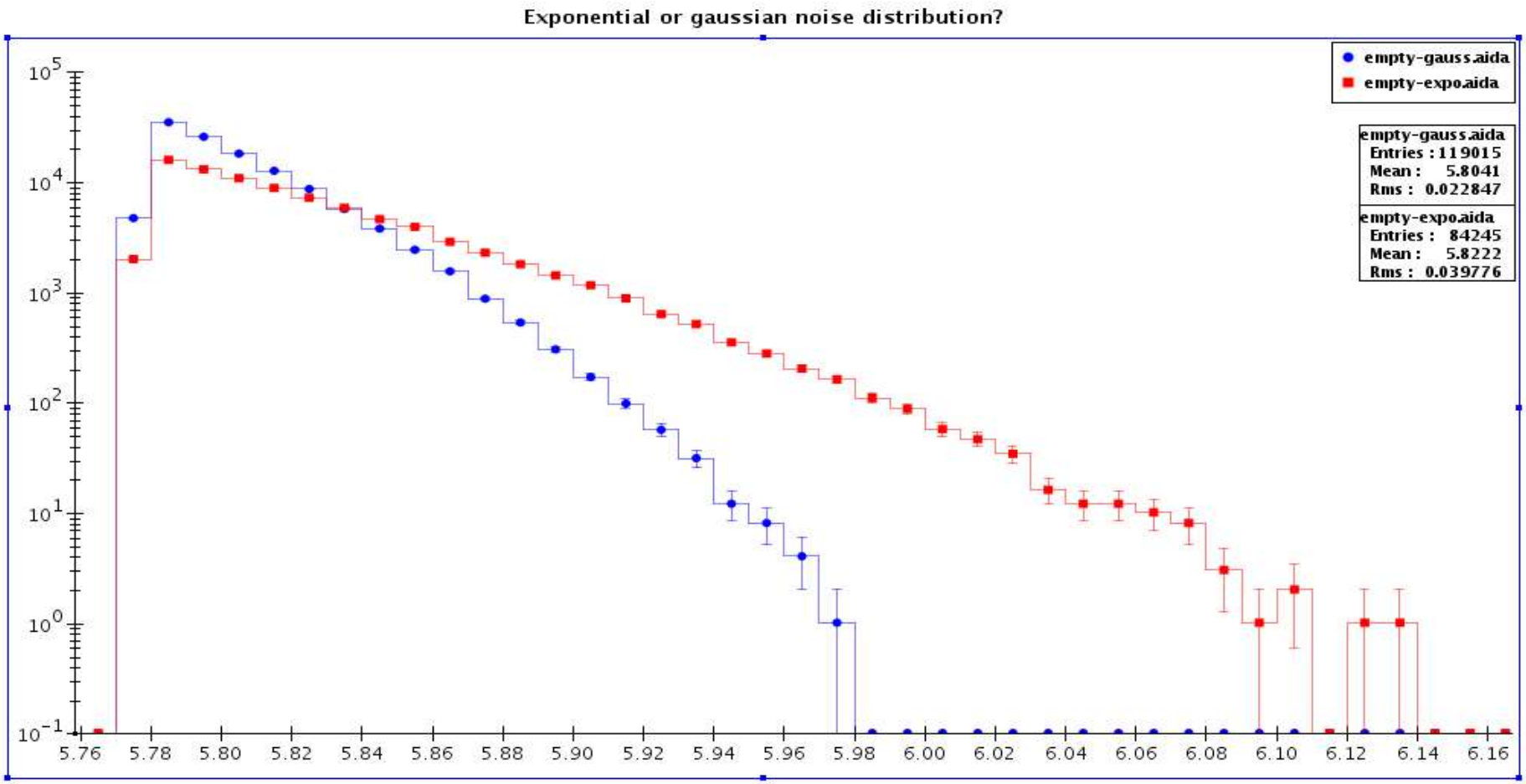


Light collection and Quantum Efficiency





Exponential and gaussian noise



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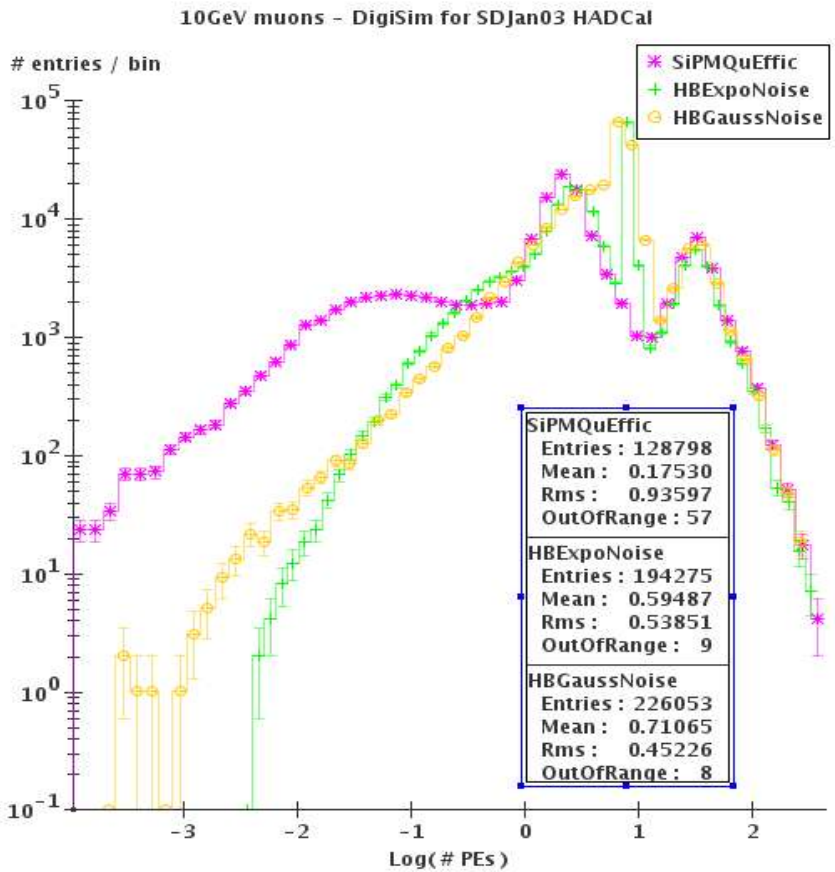
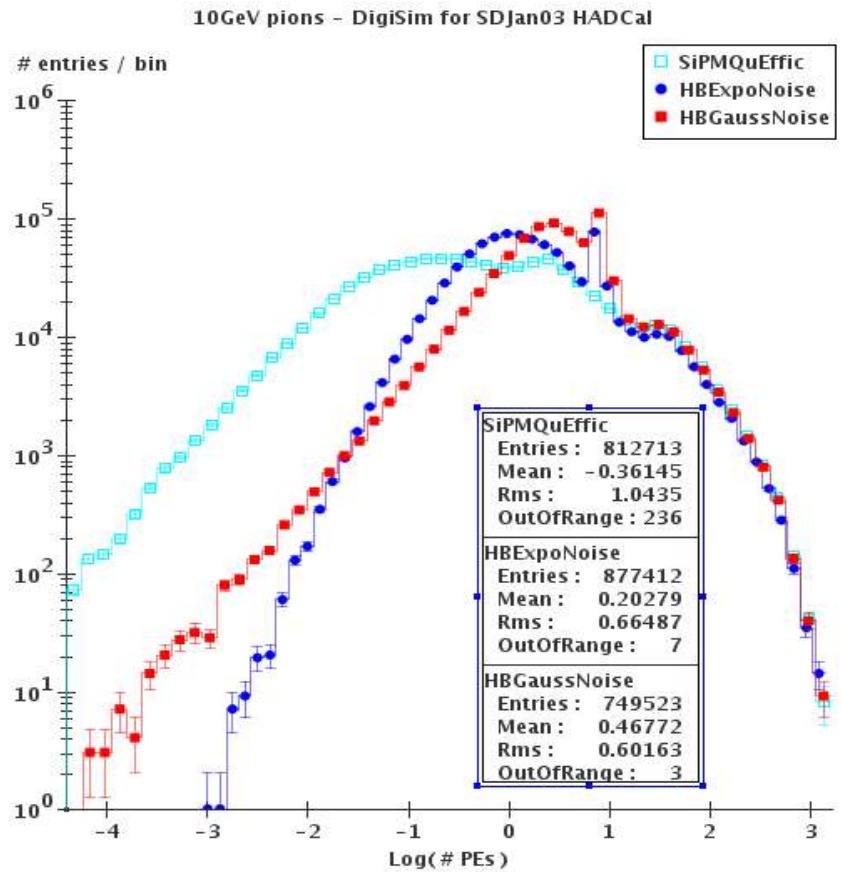
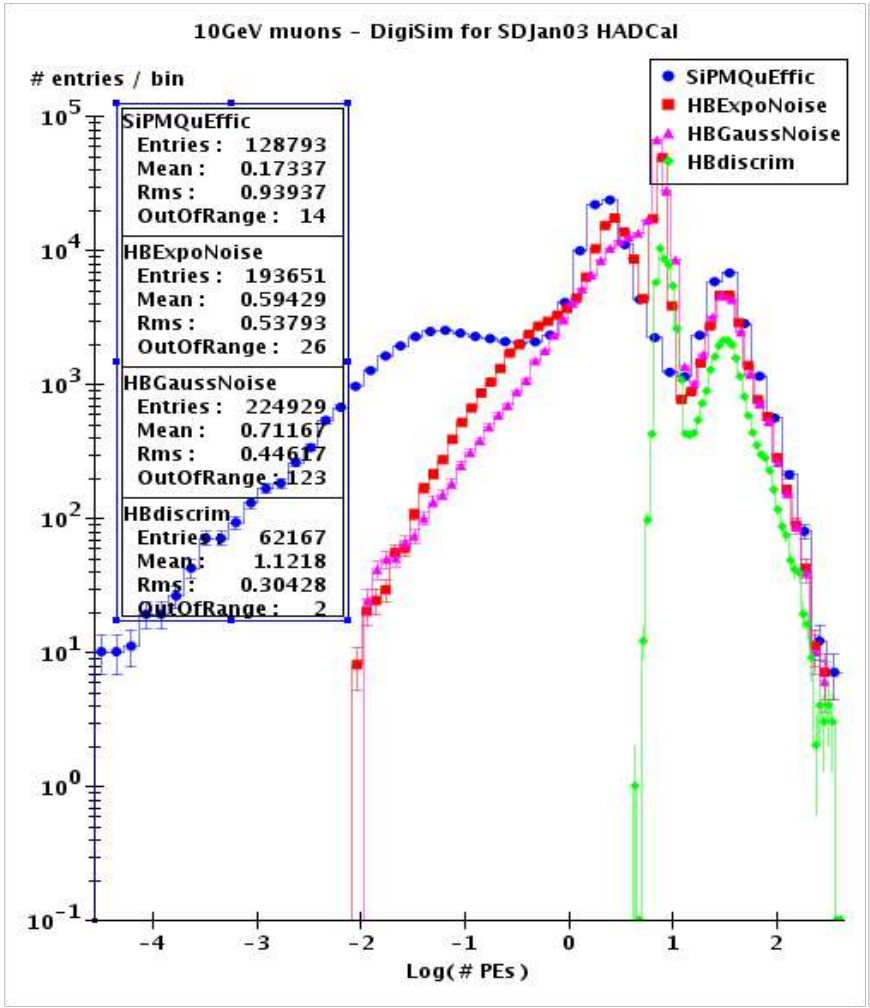
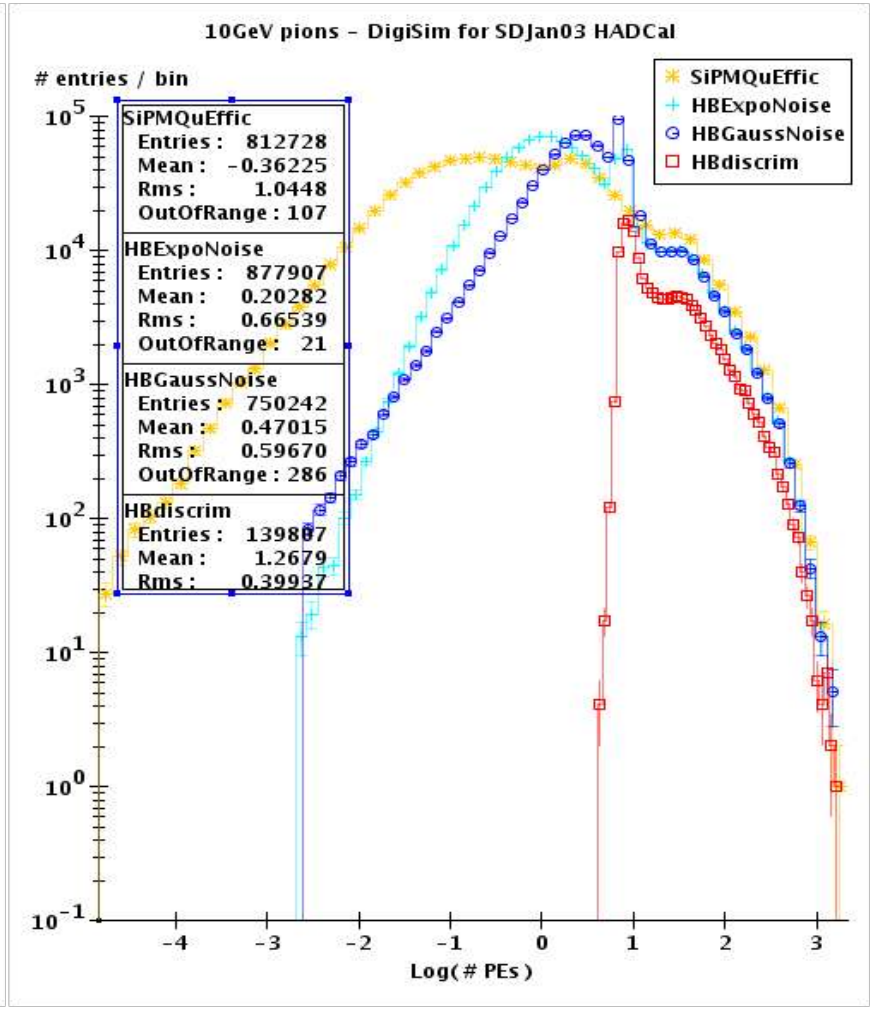


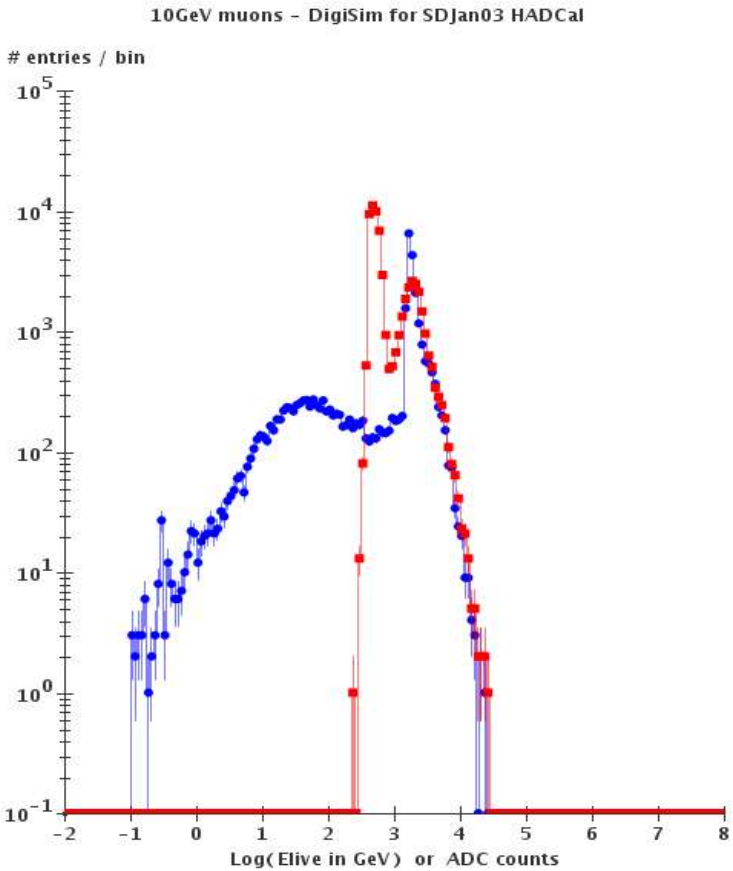


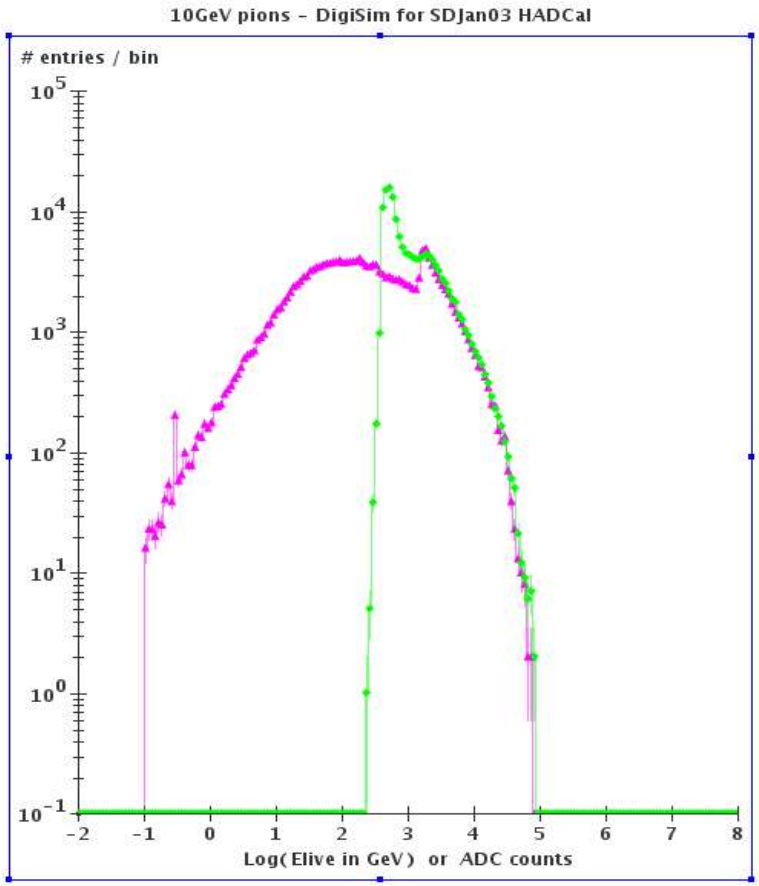
Noise and discrimination





Comparing simulated and raw hits





Software status report

Overall goal: detector optimization and PFA studies for Snowmass (August)

- org.lcsim:
  Official analysis framework for java / LCIO
  - crosstalk, noise and timing revamp (done)
  - Next steps:
    documentation update (Java)
    "backport" to C++ (by Curt D.)
    re-evaluation of some modifiers (hot/dead channels, AbsValueDiscrimination and SiPM saturation)
- Nonprojective geometries
  - org.lcsim / compact geometry description
    - Neighborhood (done, tested in sidmay05_np)
    - CellID ⇔ position cross-check
  - SLIC / LCDD (Jeremy)
- PFA development
  - Cluster interface into clustering algorithms Superlayers (old) and neighborhood density (new) (requires nonprojective geometry)
  - Investigate existing tools for PFA integration
- LCDG4 maintenance
  - EMCal cell staggering (Shenjian, Boulder) (tests before CVS commit)
  - Multiple primary vertices (diagnostics)