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Subject: Recent updates about EMC packages (B)  
Posted by [Jifeng Hu](#) on Fri, 17 Jan 2014 16:23:06 GMT  
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Updates in waveform simulation and digitization.

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Class(source) : PndEmcHitsToWaveform (EmcDigi/PndEmcHitsToWaveform.cxx),  
producing analogy waveform for each fired crystal. The waveform are modeled with empirical  
formulas which come form measurement data.

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Line : 186 PndEmcHitsToWaveform.cxx  
Changes : [OLD] pulseshape3 =new PndEmcAsicPulseshape(fFWD\_Shaping\_int\_time,  
fFWD\_time\_constant);  
[NEW] pulseshape3 =new PndEmcFwdPulseshape(fFWD\_Shaping\_int\_time,  
fFWD\_time\_constant);

Line : 267, 268 macro/params/all.par (36,37 emc.par);  
Changes : [OLD] FWD\_Shaping\_int\_time:Double\_t 8e-9  
[OLD] FWD\_time\_constant:Double\_t 25e-6  
[NEW] FWD\_Shaping\_int\_time:Double\_t 50.95e-9  
[NEW] FWD\_time\_constant:Double\_t 4.000

Purpose : Use a new pulse shape to model Forward EMC readout. This formula comes  
from the fitting of measurements in KVI.

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line : 330 macro/params/all.par (99 emc.par)  
Changes : [OLD] ForwardMWDFilterUsed:Int\_t 1  
[NEW] ForwardMWDFilterUsed:Int\_t 0  
Purpose : With the new pulse shape, the step of moving window deconvolution in FPGA  
extraction simulation is redundant and closed.

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Comments : This class has two run modes, when invoking  
PndEmcHitsToWaveform->RunTimeBased();  
all waveforms produced will be stored in the data buffer of  
PndEmcWaveformWriteoutBuffer, pileup effect thus is simulated.

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Class(source) : PndEmcWaveformToDigi (EmcDigi/PndEmcWaveformToDigi.cxx),  
Line : 131 PndEmcWaveformToDigi.cxx  
Changes : [OLD] fPulseshape\_fwd =new  
PndEmcAsicPulseshape(fFWD\_Shaping\_int\_time, fFWD\_time\_constant)  
[NEW] fPulseshape\_fwd =new PndEmcFwdPulseshape(fFWD\_Shaping\_int\_time,  
fFWD\_time\_constant)

Purpose : see above description in PndEmcHitsToWaveform.

Line : 404 PndEmcWaveformToDigi.cxx

Changes : [Add]

myDigi->SetTimeStampError(digiCalib.GetTimeResolutionOfDigi(myDigi));

Purpose : assign an error of time-stamp to a digi (need discussion).

Line : 467-473 PndEmcWaveformToDigi::FinishTask() (PndEmcWaveformToDigi.cxx)

[Add] if(fTimeOrderedDigi){

Int\_t nWaveforms = fWaveformArray->GetEntriesFast();

if(fVerbose>0){

std::cout<<"PndEmcWaveformToDigi::FinishTask, fWaveformArray size

#"<<nWaveforms<<std::endl;

}

Exec("");

}

Purpose : In mode of time-based simulation, some waveforms in PndEmcWaveformWriteoutBuffer are left without digitization in event loop. so call Exec("") once more.

Line : 297-309 PndEmcWaveformToDigi.cxx

Changes : comment off

Purpose : In time-based simulation mode, streaming out time-ordered PndEmcWaveform to ROOT file was canceled, and streaming out time-ordered PndEmcDigi now is used.

Line : 400 PndEmcWaveformToDigi.cxx

Changes : [Add] fdigiTime -= digiCalib.GetTimeShiftOfDigi(fMod);

Purpose : New time-stamp of digis are used. In origin, the time-stamp of digis includes the following part:

T\_digi = T\_evt + T\_waveform + T\_fpga,

where T\_evt is the event start time; T\_waveform is the start time of a signal pulse, which also equals to the flying time of particle going through a crystal and leaving hits; T\_fpga is the time between the waveform starts and a digi is triggered. Now, the last time item T\_fpga was subtracted after digitization.

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Class(source) : [Add] PndEmcRingSorter (EmcTimebased/PndEmcRingSorter.cxx),  
PndEmcSorterTask(EmcTimebased/PndEmcSorterTask.cxx)

Purpose : They are used for streaming out time-ordered PndEmcDigi.

Class(source) : [Remove] PndEmcWaveformRingSorter  
(EmcTimebased/PndEmcWaveformRingSorter.cxx),  
PndEmcWaveformSorterTask(EmcTimebased/PndEmcWaveformSorterTask.cxx)

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