

ECAL Pre-firing

This page gives details about different aspects of the ECAL trigger pre-firing and related studies.

ECAL Pre-firing

tbd

Sources

tbd

Studies to be performed

In order to mark the ECAL Pre-firing studies as complete, we need following four studies.

Measurement of effects using data and emulated TPs.

tbd

Measurement using gap flag studies

tbd

Measurement using June 2018 time scan data

tbd

Measurement using simulation

At this moment most of the information below comes from the email by Kostas.

- Step 1: Install CMSSW

```
cmsrel CMSSW_10_3_0_pre5
cd CMSSW_10_3_0_pre5/src
cmsenv
scram b
```

- Step 2: Install SimCalorimetry and change timephase

Following line will copy the SimCalorimetry/EcalSimAlgos package from the official installed CMSSW package.

```
cp -r $CMSSW_RELEASE_BASE/src/SimCalorimetry/EcalSimAlgos
```

We will edit the line number 219 of this file SimCalorimetry/EcalSimAlgos/src/EcalHitResponse.cc

```
emacs SimCalorimetry/EcalSimAlgos/src/EcalHitResponse.cc
```

go to line 219 and edit the timing/delay/phase

ECALTriggerPre-firing < Main < TWiki

```
const double tzero = ( shape()->timeToRise()  
                      + parameters->timePhase()  
                      - 17.0  
                      - jitter  
                      - BUNCHSPACE*( parameters->binOfMaximum()  
                                     - m_phaseShift  
                                     ) ) ;
```

once the .C file is changed, compile the package.

```
scram b -j 4
```

if it compiles fine, we have finished second step.

- Step 3 Run the cmsDriver command which will return a python file which you can run using cmsRun

```
cmsDriver.py ZEE_13TeV_TuneCUETP8M1_cfi --conditions auto:phase1_2018_realistic -n 20 --era R
```

if the output is step_0.py use

```
cmsRun step_0.py
```

Run the cmsDriver command which will return a python file which you can using cmsRun and output of previous step is input for this step.

```
cmsDriver.py step2 --conditions auto:phase1_2018_realistic -n 100 --era Run2_2018 --eventconten
```

if the output is step_1.py use

```
cmsRun step_1.py
```

Copy of email

Because of the mixing and the perplexed structure of cmsDriver output, I wasn't able to fully understand in which parts of the python the timephase should be modified (see below*).

At the moment, I think the safest way to inject the delays, is unfortunately to checkout

SimCalorimetry/EcalSimAlgos

and modify

<http://cmslrx.fnal.gov/source/SimCalorimetry/EcalSimAlgos/src/EcalHitResponse.cc#0219>

adding by hand a line with the desired delay.

Looking at the output of this manual intervention for a -17ns delay this has significant effect, in the hits energy

but I have no quick way to check the Digi/Pulses. Before asking for MC production, would you Dave or anybody else be able to have a quick look in the corresponding Digis and verify that the delay is in the direction we want ?

I placed 2 files in

/afs/cern.ch/user/t/theofil/public/preFiring

Measurement using simulation

produced with CMSSW_10_3_0_pre5 with

- cmsdriver command

```
cmsDriver.py ZEE_13TeV_TuneCUETP8M1_cfi --conditions auto:phase1_2018_realistic -n 20 --era Run2_2018 --eventcontent FEVTDEBUG -s GEN,SIM --datatier GEN-SIM --beamspot Realistic25ns13TeVEarly2017Collision --geometry DB:Extended --python ZEE_13TeV_TuneCUETP8M1_2018_GenSimFull.py --fileout file:step1.root --nThreads 8
```

and

```
cmsDriver.py step2 --conditions auto:phase1_2018_realistic -n 100 --era Run2_2018 --eventcontent FEVTDEBUGHLT -s DIGI:pdigi_valid,L1,DIGI2RAW,HLT:@relval2018 --datatier GEN-SIM-DIGI-RAW --geometry DB:Extended --dump_python --python DigiFull_2018.py --filein file:step1.root --fileout file:step2.root --nThreads 8
```

change in C++ code:

```
const double tzero = ( shape()->timeToRise() + parameters->timePhase() - 17.0 - jitter - BUNCHSPACE*( parameters->binOfMaximum() - m_phaseShift ) ) ;
```

- Two test samples have been already generated by Kostas, located at:
/afs/cern.ch/user/t/theofil/public/preFiring

Important Links

- Trigger Emulation: <https://iopscience.iop.org/article/10.1088/1742-6596/219/3/032009/pdf>
- https://indico.cern.ch/event/729127/contributions/3014895/attachments/1655476/2649972/2018_05_24_PPD_
- https://indico.cern.ch/event/726510/contributions/3012698/attachments/1654740/2648394/ecaltp_prefire_dpg
- https://indico.cern.ch/event/730883/contributions/3012866/attachments/1653538/2646197/2018_05_17_prefir
- <https://indico.cern.ch/event/725617/contributions/2985120/attachments/1640817/2620207/go>

-- RamanKhurana - 2019-07-18

This topic: Main > ECALTriggerPre-firing

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