

Status of sFCal Simulation

Physics & Performance Week – Simulation Meeting

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► Simulation

- MinBias & single pion samples in prodsys
- Standard samples for Scoping Document

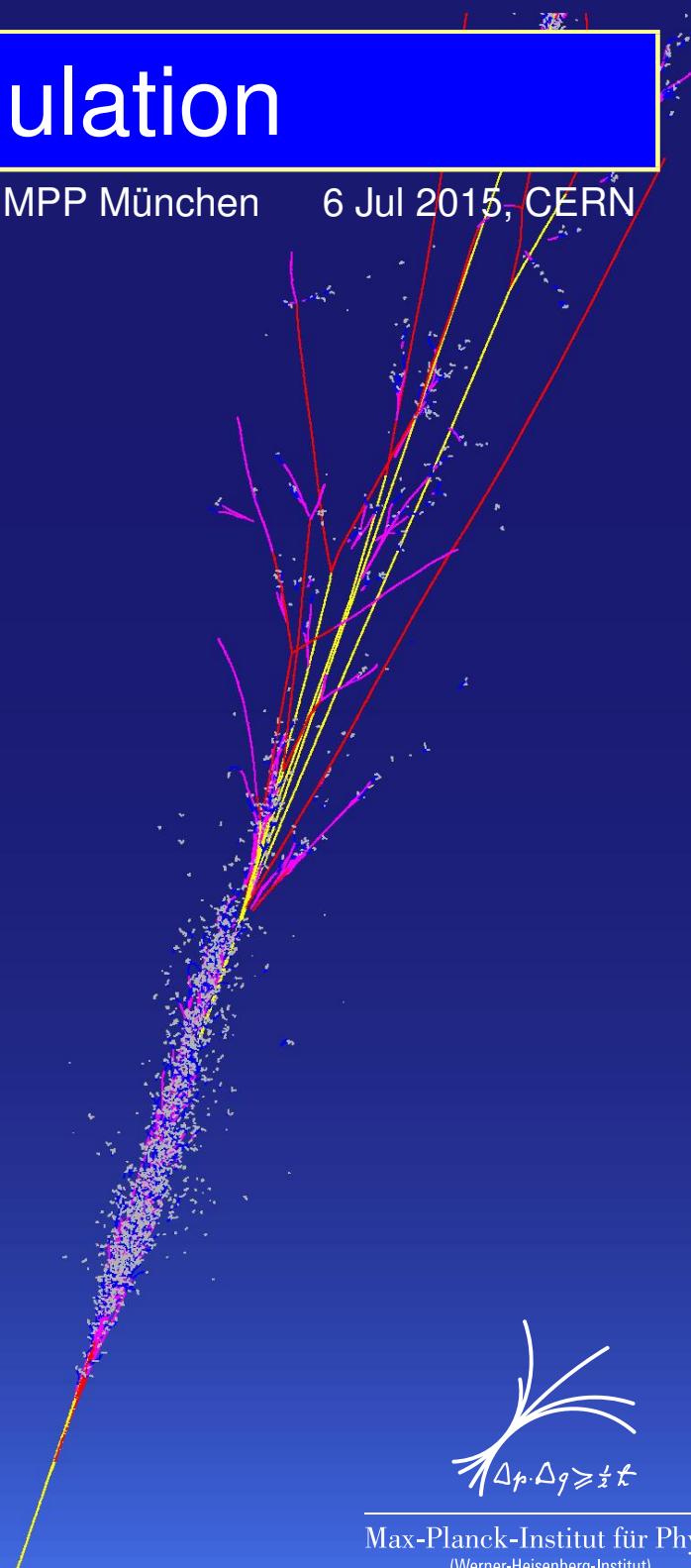
► Digitization

- Noise folders to be produced this week

► Reconstruction

- All in place (except Local Hadron Calibration – which needs noise+digi first)

► Next Steps

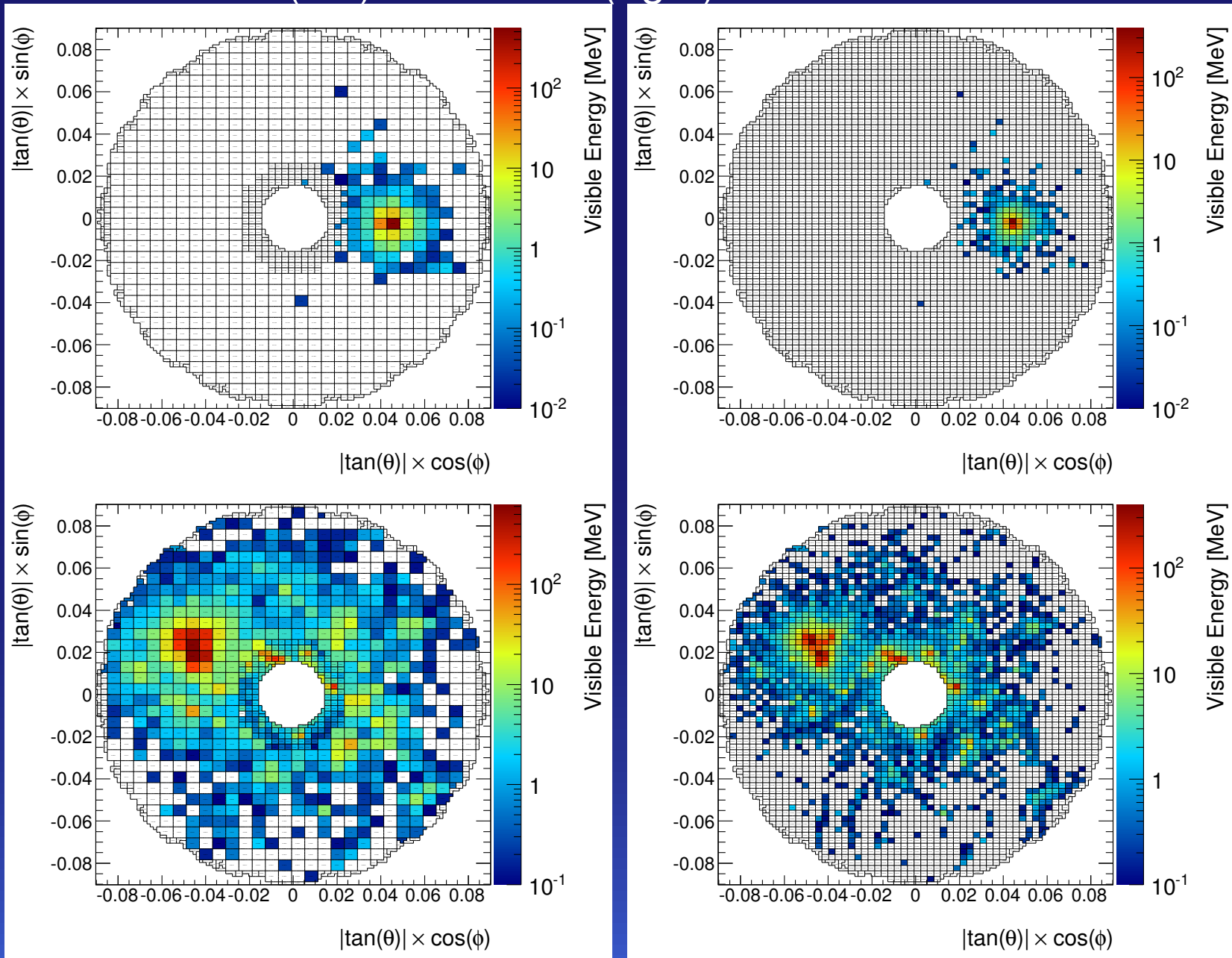


Simulation

- ▶ Works fine since December
- ▶ Geometry tags (recently renamed by Vakho):
 - `ATLAS-P2-SFCAL-01-00-00` fine granularity and **small** LAr gaps
 - `ATLAS-P2-SFCAL-02-00-00` fine granularity and **large** LAr gaps
 - `ATLAS-TEST-SFCAL` fine granularity and **large** LAr gaps with Run1-type rest of ATLAS
- ▶ SW tags:
 - `IdDictParser-00-02-30` for dictionary with online and offline identifier ranges
 - `LArReadoutGeometry-00-01-01` for modified `FCAL_ChannelMap.cxx` to cope with 3-digit eta indices (backward compatible with 2-digit eta indices)
- ▶ Both tags are in `AtlasProduction-19.2.3.8` which is the simul release
- ▶ `AtlasG4_tf.py` and `Simul_tf.py` work out of the box
- ▶ Single pions are finished in prodsys (AMI tags `s2641`, `s2639`)
- ▶ MinBias samples are finished in prodsys (AMI tags `s2640`, `s2638`)

Simulation

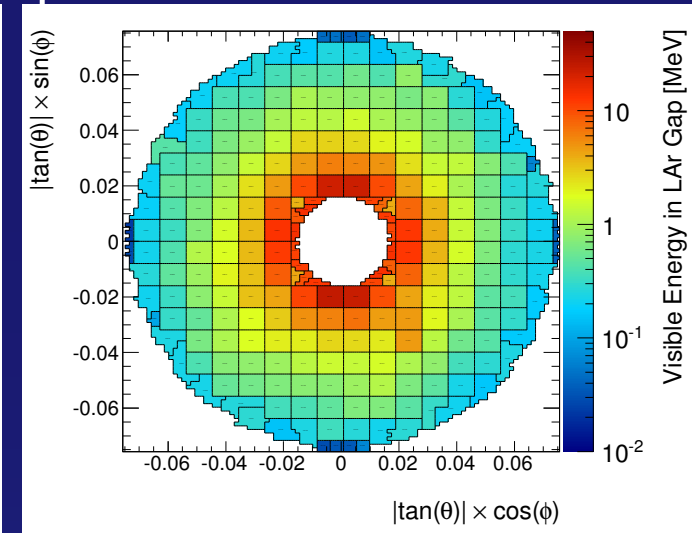
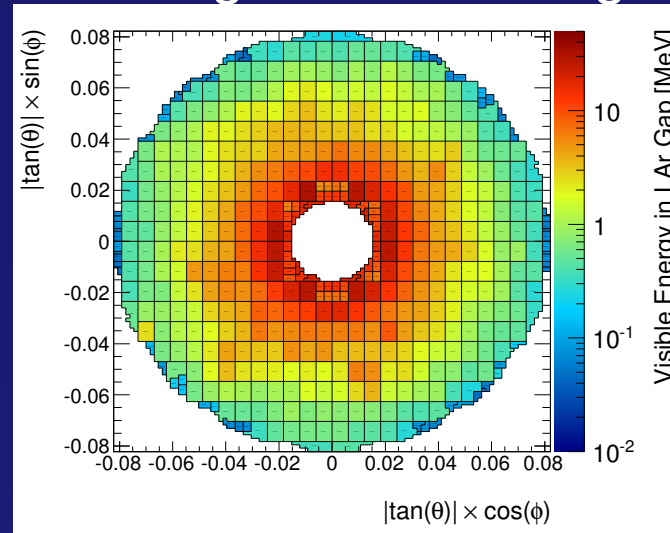
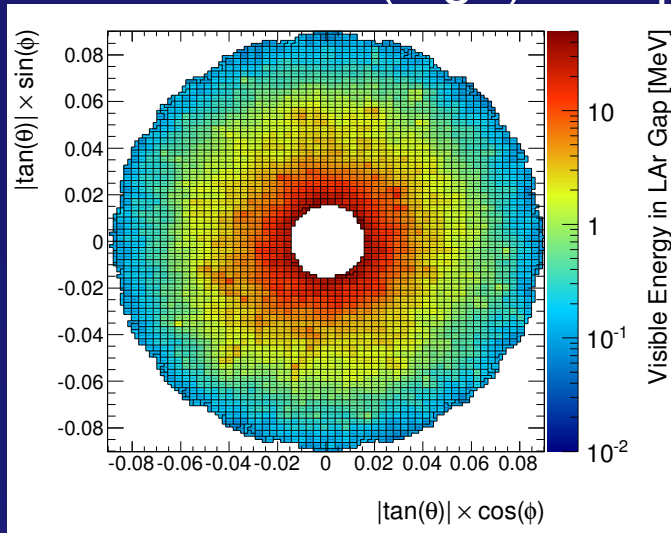
▶ Electron in FCal (left) and sFCal (right)



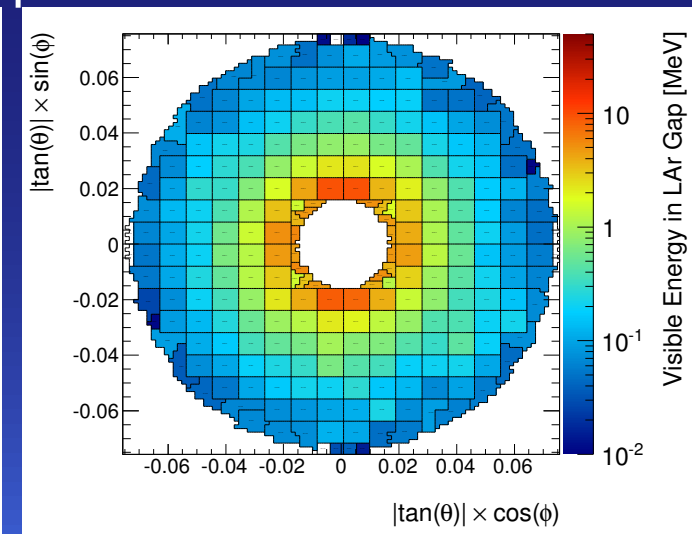
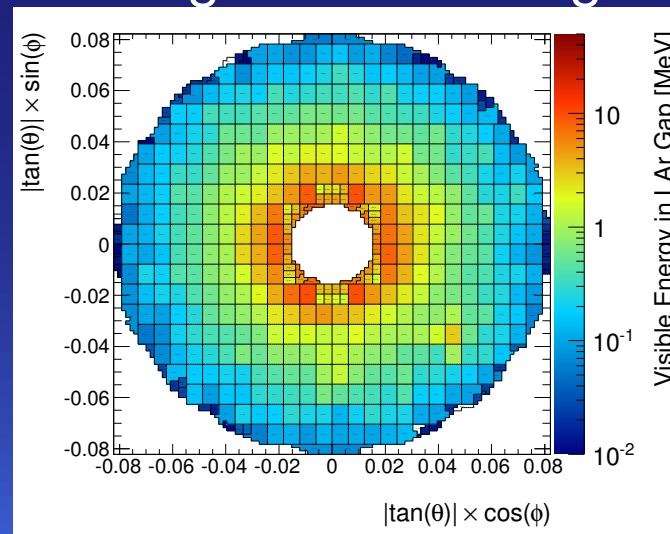
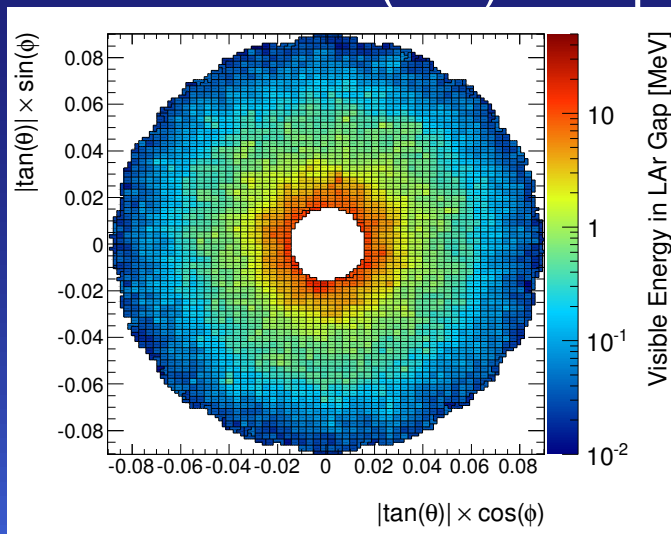
▶ Jet in FCal (left) and sFCal (right)

Simulation ► finished prodsys samples (from left) sFCal1/2/3

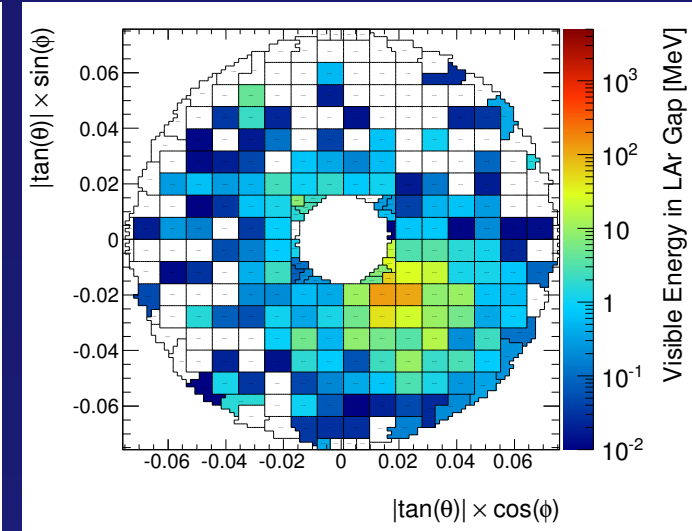
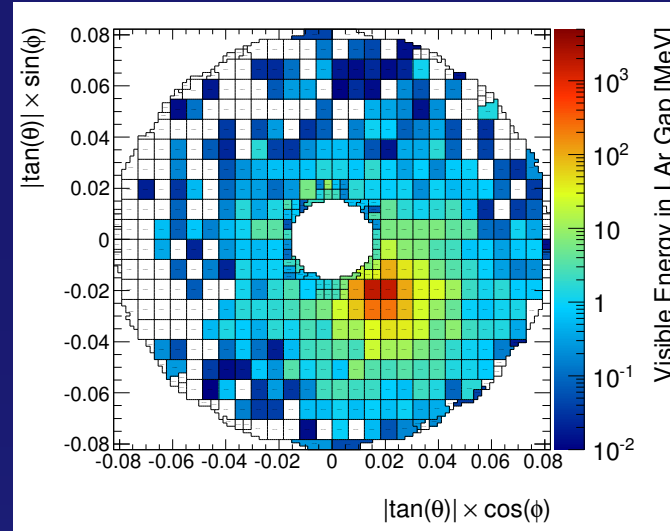
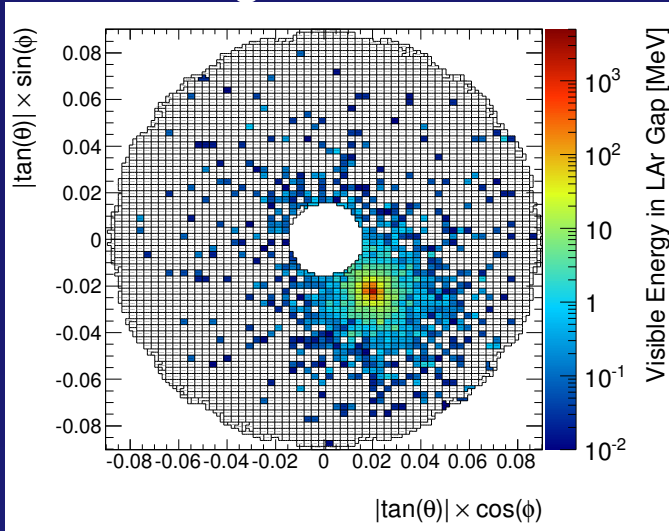
► MinBias (high) sample average visible energies per cell



► MinBias (low) sample average visible energies per cell



► Single π^- with $E = 800$ GeV



Digitization

- ▶ Compared to Simulation and Reconstruction Digitization needed the most changes (code and conditions)
- ▶ `IdDictParser-00-02-30` contains the online Identifiers
- ▶ `/LAR/Identifier` folders `OnOffIdMap` and `CalibIdMap` with tag suffixes `SFCAL-000` contain the mapping of offline to online Identifiers (prepared by Walter Lampl)
- ▶ `/LAR/ElecCalibMC` folders `AutoCorr`, `DAC2uA`, `HVScaleCorr`, `MinBias`, `MinBiasAverage`, `Noise`, `Ramp`, `Shape`, `fSamp1`, `uA2MeV` exist for both versions of sFCal (prepared by Pavol Strizenec)
- ▶ `LArIdentifier-01-02-07` is used to check for validity
 - ▶ this tag is identical to branch tag `LArIdentifier-01-02-06-02` after testing in a MIG nightly the following changes:
 - ▶ All inlined code in headers with cond. data moved to non-inlined code
 - ▶ This makes this version of `LArIdentifier` suitable for caches
- ▶ The tag is compatible with regular FCal geometry as well (both identifier ranges are valid LAr FCal identifiers)
- ▶ `Digi_tf.py` runs out of the box in `AtlasProduction-20.3.X`

Reconstruction

- ▶ Full reconstruction including topo clustering works
- ▶ `CaloIdentifier-00-10-84` contains the new neighbor tables for the sFCal
- ▶ Vakho added the table names to the 3 geo tags
 - ▶ these tables are not needed for simul+digi but caused some confusion in HIT merging in `19.2.3.8`
 - ▶ always use
`--postExec="ServiceMgr.DetDescrCnvSvc.DoInitNeighbours = False"` in releases prior to `20.3.X` (for non-reco tasks)
- ▶ `Reco_tf.py` was the last transform to get fully working for ITK + sFCal geometries
 - ▶ needed recent B-tag code and conditions for that
- ▶ `AtlasProduction-20.3.X` can be used to run full `Reco_tf.py`

Next Steps

- ▶ Pavol Strizenec starts to work on the MinBias noise folders for sFCal this week
- ▶ Digitization + reconstruction of single pion samples comes next
 - ▶ Local Hadron Calibration weights will need ~ 3 days to derive from these
- ▶ Standard Samples (di-jet, light Higgs VBF, etc.) requested in prodsys already for simul only
 - ▶ will request digi+reco as soon as Noise+LCW are available
- ▶ Ariel et al. to look into Jet smearing in sFCal region for Scoping Document once the reco samples are available
 - ▶ needs code change from rel17 to rel20 ...
- ▶ Compare impact of PileUp in sFCal and FCal
- ▶ Evaluate VBF Higgs searches potential with sFCal
 - ▶ plot shows η distribution of outgoing quarks from $qq \rightarrow H^0 qq$

