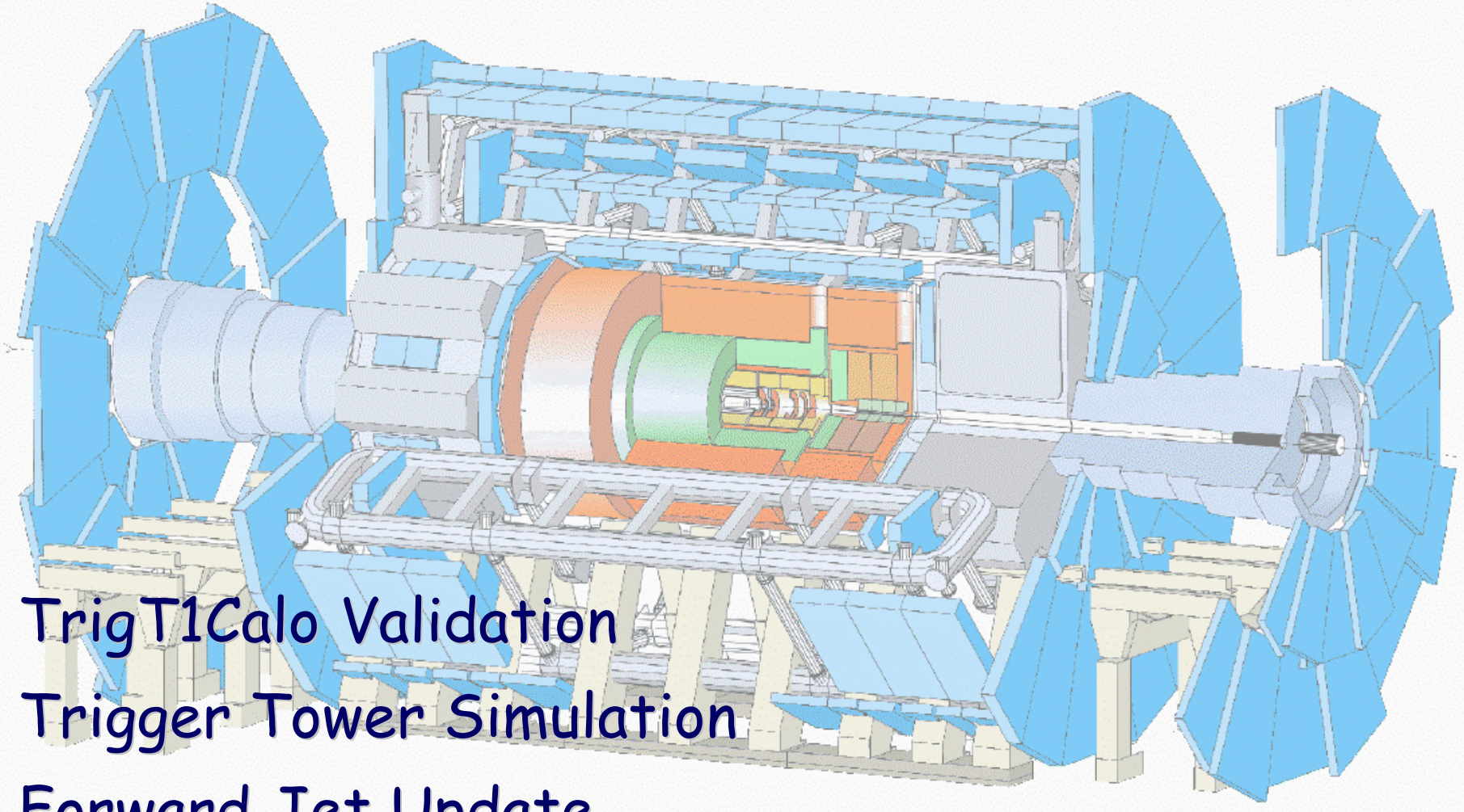
A Mixed Bag of Simulation Stuff



TrigT1Calo Validation

Trigger Tower Simulation

Forward Jet Update

Birmingham ATLAS PC Farm

The new toy has arrived

- 38 dual 2 GHz P4 nodes
- 1 GB RAM/2-proc node
- 4 TB RAID

Applications

- MC production
  - Trigger-specific datasets
  - Data Challenges
- GRID development
- Warming the computer room ☺

What next?

- Install software
- Start to use it!

TrigT1Calo Validation

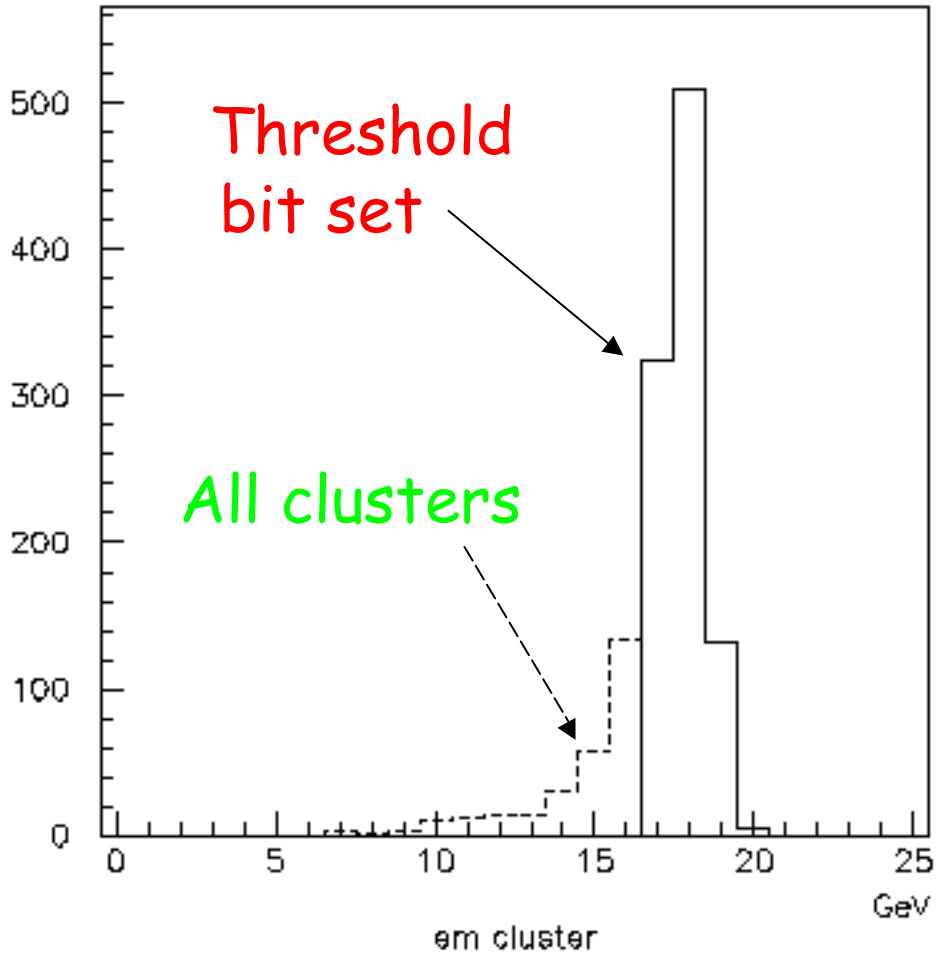
Technical Tests OK

- Cluster, isolation sum formation correct
- Thresholds correctly applied
  - Cluster > Threshold
  - Isolation ≤ Thresholds

    These conventions allow to disable isolation or switch off threshold

    Different from Atrig, but these are correct
- Trigger bits set correctly
  - Thresholds = 1-16
  - Bits = 0-15

Threshold: $E_T > 16$ GeV



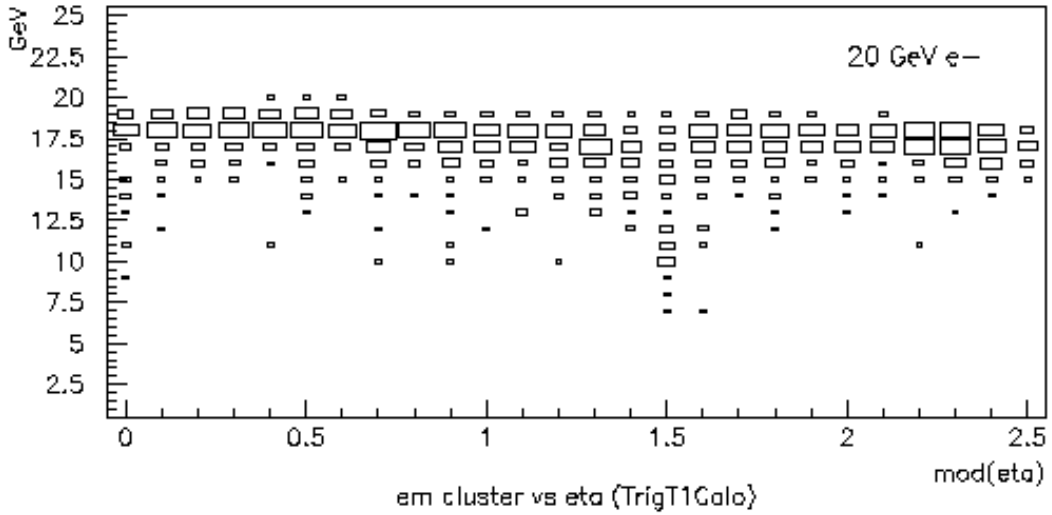
TrigT1Calo-Atrig Comparisons

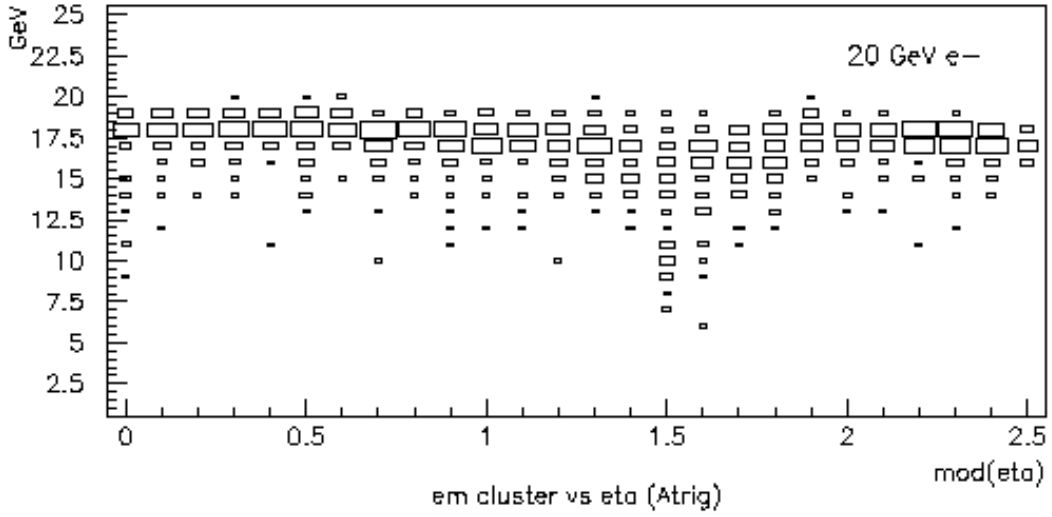
Conditions

- Turn off Atrig noise, calibrations
  - not implemented in TrigT1Calo
- Use same TDR datasets

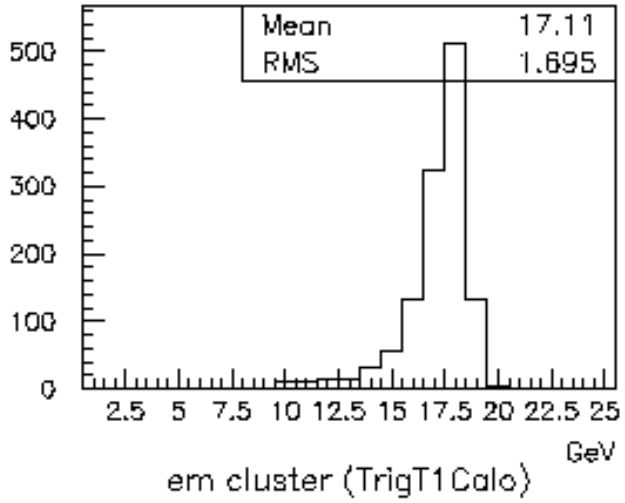
Tests

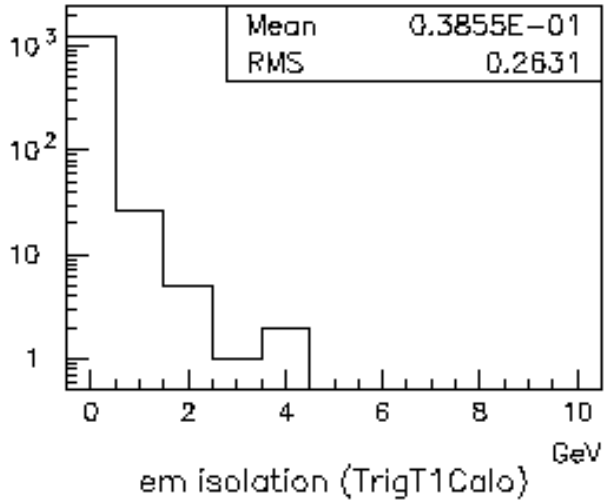
- Single particle events most sensitive tests
  - few minor problems spotted and fixed
- Distributions not identical, but consistent

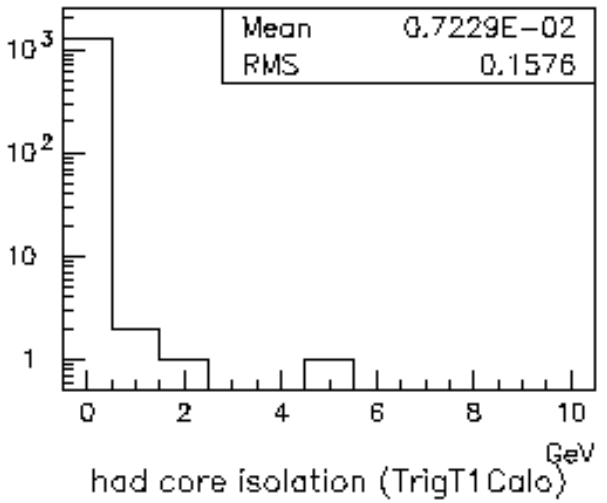


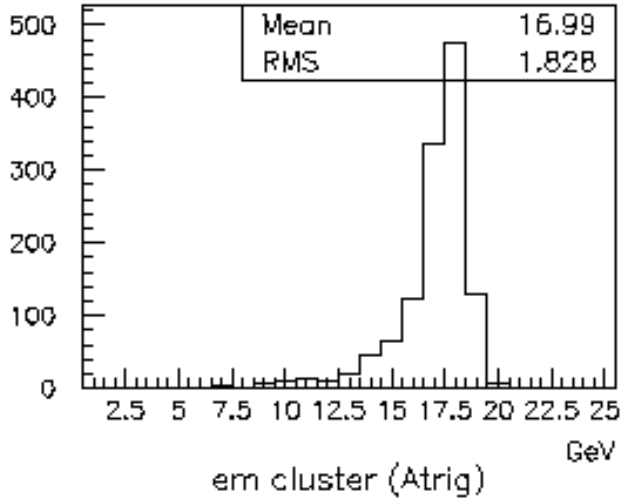


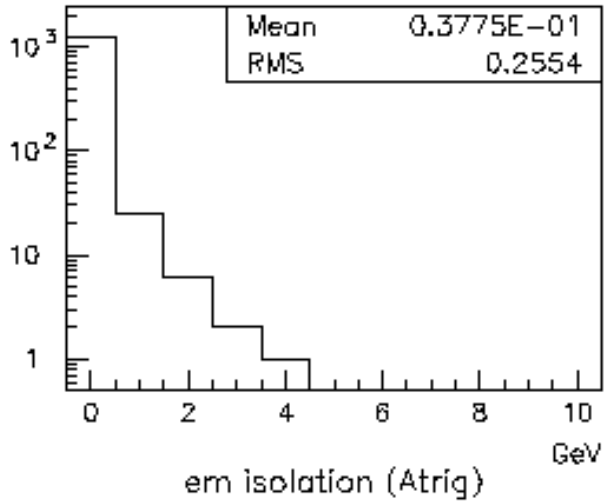
Comparisons – 20 GeV e-

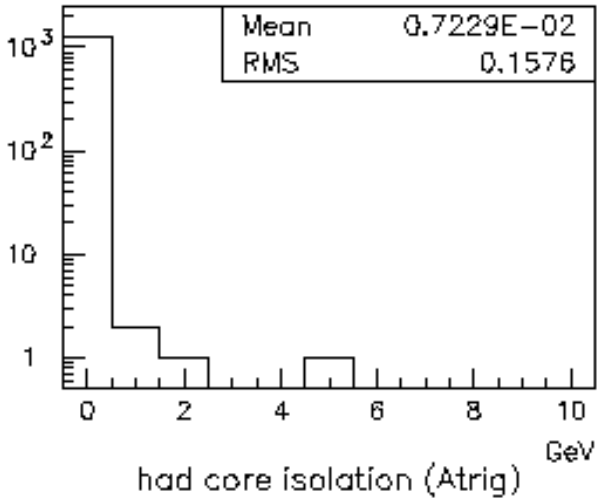












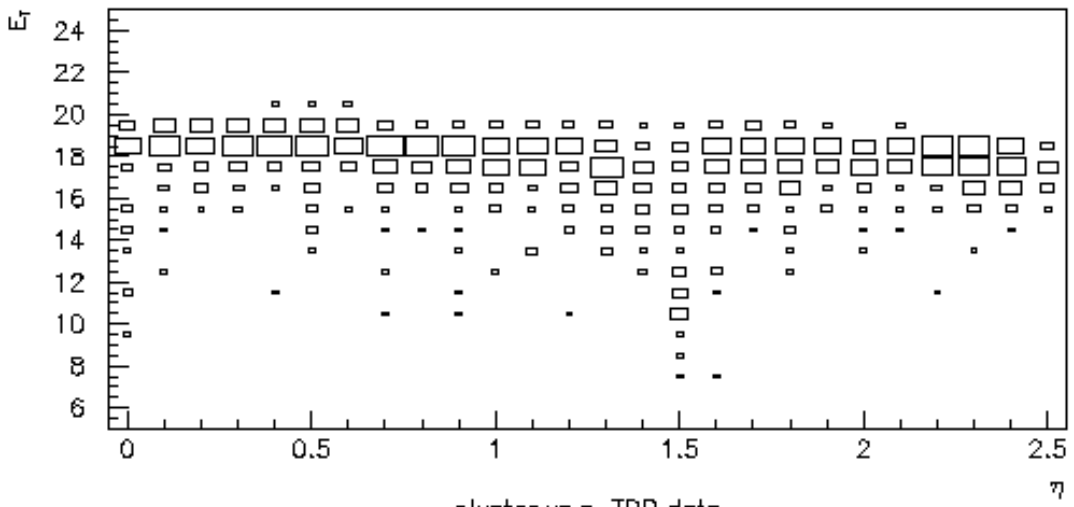
DC1 Datasets

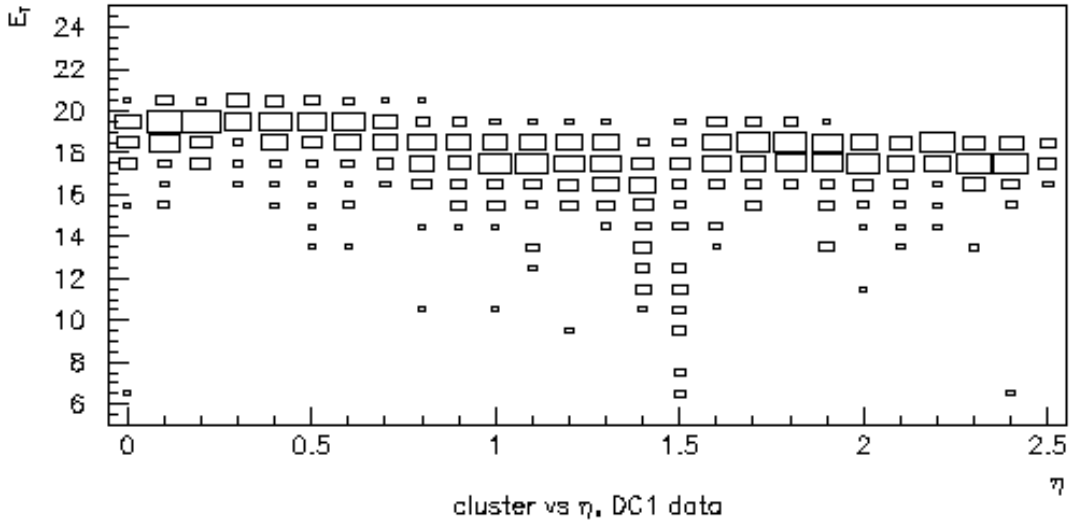
New detector model

- More material
- Larger inter-cryostat gap

Nothing qualitatively different

- some effects more pronounced
- calibrations, thresholds will be different





Trigger Tower Simulation

The Plan:

- Trigger tower simulation with
  - correct geometry
  - correct noise
  - pulses with time profile
- Realistic PreProcessor simulation
  - FIR based BCID
  - FIR/LUT based calibration, thresholds
- Integration with TrigT1Calo
  - PPr sim ⇒ TriggerTowers

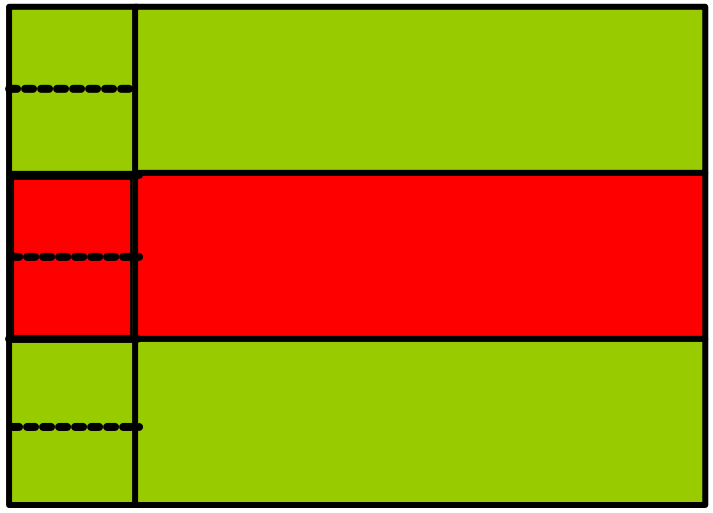
The Proposal:

- Similar breakdown to hardware
  - Tile group ⇒ TileT1Towers
  - LAr group ⇒ LArT1Towers
  - LVL1 group ⇒ PPr sim
- People identified
  - Tile: Frank Merritt
  - LAr: Fabienne LeDroit
  - LVL1: ATW
- Tilescales
  - Tile: soon
  - LAr: end of year
  - LVL1: between the two

Forward Jet Algorithm Options

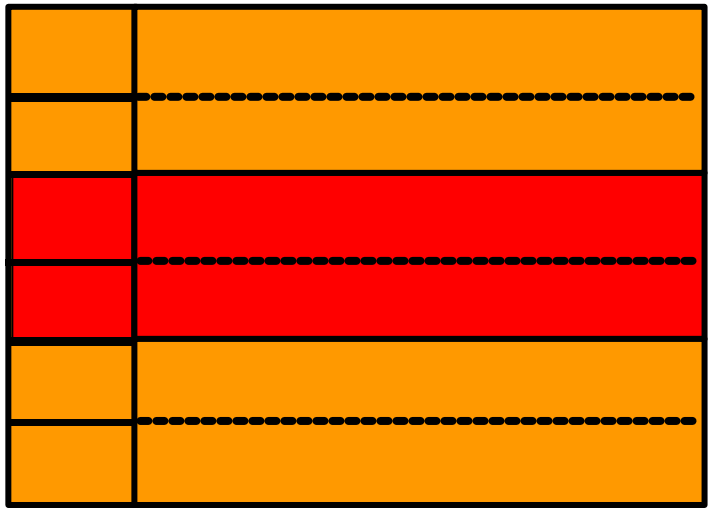
Distinct:

- Base on FCAL granularity
- Add last endcap elements to provide overlap



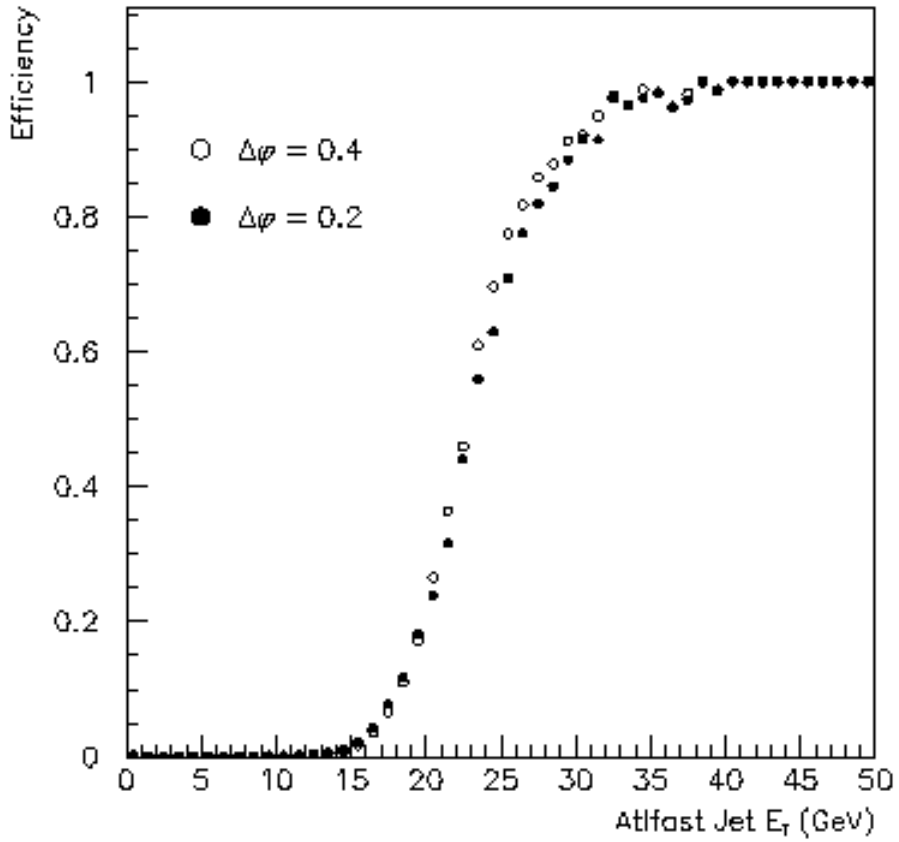
Continuous:

- Base on endcap granularity
- Divide FCAL towers and use common algorithm



Preliminary Forward Jet Performance

Threshold Sharpness



Rates (Forward+Backward)

$\mathcal{L} = 2\times10^{33}cm^{-2}s^{-1}$ (no pileup!)

95% efficiency thresholds

Thresholds	Rate (kHz)
F+B > 20 GeV	60
F+B > 30 GeV	6
F+B > 40 GeV	1.5
F+B > 20, 40 GeV	10
F+B > 30, 40 GeV	4

Combination Triggers (Preliminary)

- $\mathcal{L} = 2\times10^{33}cm^{-2}s^{-1}$. No pileup (beware!).
- EM = 95% efficiency. TAU, XE = hardware thresholds

	F+B > 20	F+B > 30	F+B > 40	F+B > 20,40
EM15i	2 kHz	70 Hz	-	500 Hz
2×EM10i	500 Hz	-	-	70 Hz
TAU15i	4 kHz	900 Hz	300 Hz	1.3 kHz
2×TAU10i	400 Hz	70 Hz	-	130 Hz
XE20	6 kHz	1.7 kHz	800 Hz	3.5 kHz
XE30	900 Hz	300 Hz	130 Hz	700 Hz

How to define "Forward" Jets?

Default:

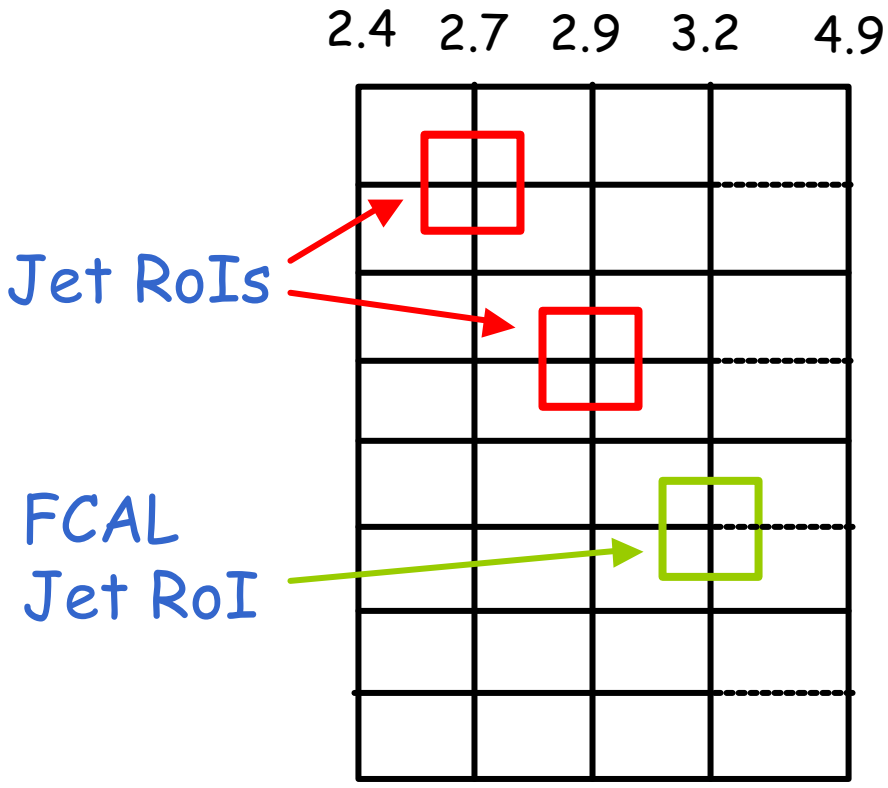
- "Forward" = FCAL

Easy(ish):

- "Forward" includes $|h| > 2.4$

Physics Preferences:

- "Forward" includes $|h| > 2.0$
  - possible with firmware mods
  - not ideal (3 JEM firmwares)
- Analysis uses "rapidity gap" rather than fixed h ranges
  - not natural for architecture
  - not enough internal bandwidth to do properly
  - can explore practical approximations



Outstanding Questions

What is best algorithm?

- "0.2" granularity preferred technically

How should we define "forward"?

- By default, "forward jet" = FCAL
- Could (in principle) count jets at smaller h as "forward"
  - Strongly favoured by Higgs WG
  - Consequences require study

What is real performance?

- New simulation software and datasets should answer