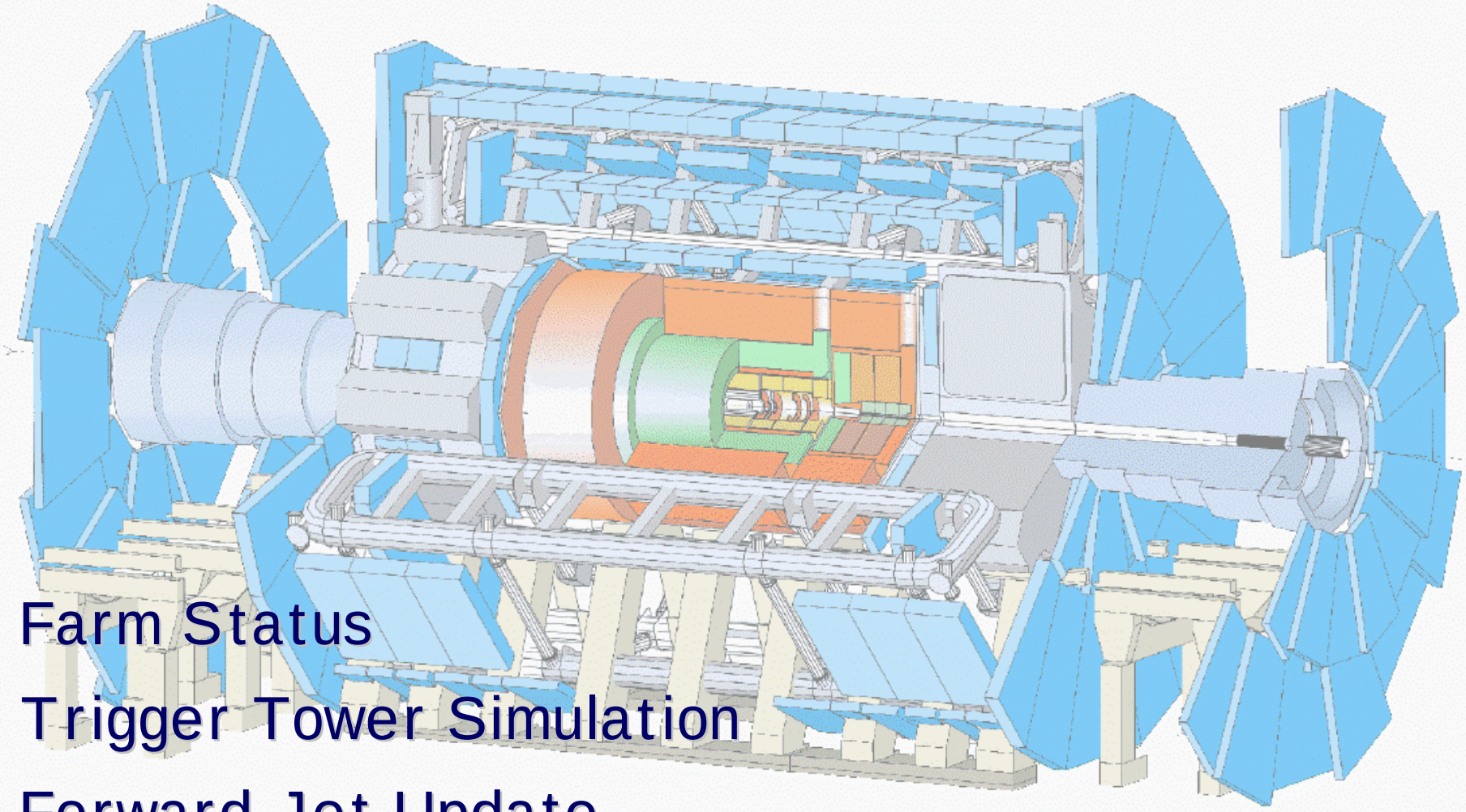
Various Simulation Updates



Farm Status

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

Current Status

- 24 nodes, 50% RAID on-line
  - To avoid overheating room!
- 2 login nodes, batch on rest
- DC1 software running
  - Validation OK
  - Start pileup production soon

Trigger Tower Simulation – Wish List

Currently:

- Form Trigger Towers directly from calo cell E_T
- No noise or calibration, purely geometrical summation

Ideally:

- Correct summing of cells → towers
  - Non-geometrical in several places
- Correct noise levels
- Time profile of pulses
  - Allow full simulation of Level-1 PreProcessing

Trigger Tower Simulation - Plan

Breakdown of work

- LAr analogue tower simulation ⇒ LAr group
  - Fabienne LeDroit
- Tile analogue tower simulation ⇒ Tile group
  - Frank Merritt
- Digital processing ⇒ Level-1 group
  - Alan Watson (!)

Timescale

- Aim to have something by end of year

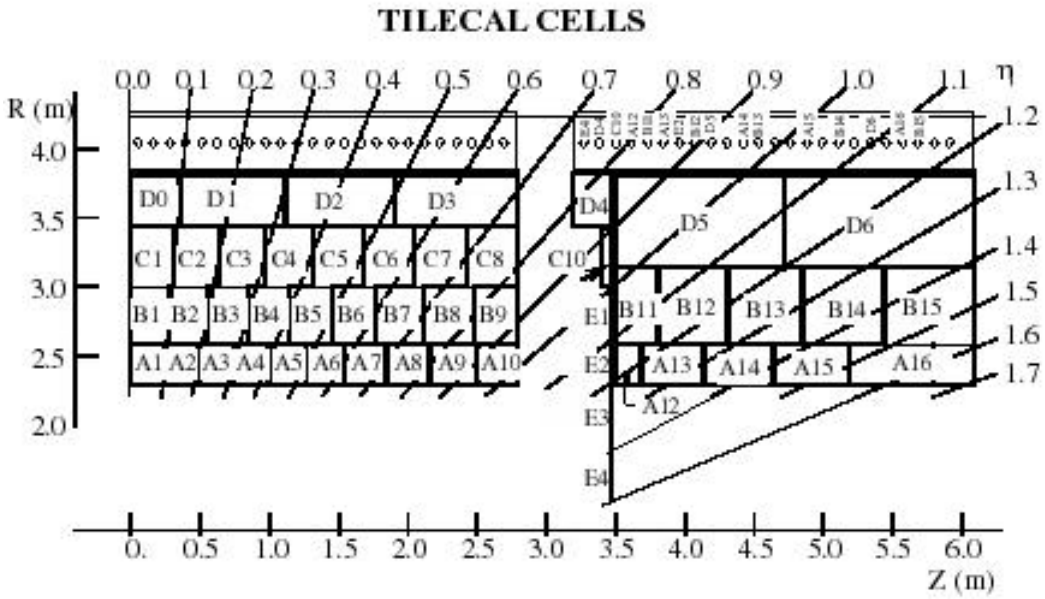
Example: Tile Towers

Inputs

- Start from "TileHits"
  - Correspond to PMT signals
  - Sum to towers as $\Rightarrow$

Properties

- 30×64 towers
  - h = -14-15, f = 0-63
- Return tower identifier
- Return E_T in 9 time samples
  - As for TileDigits
- Various iterators
  - All towers, rectangular areas



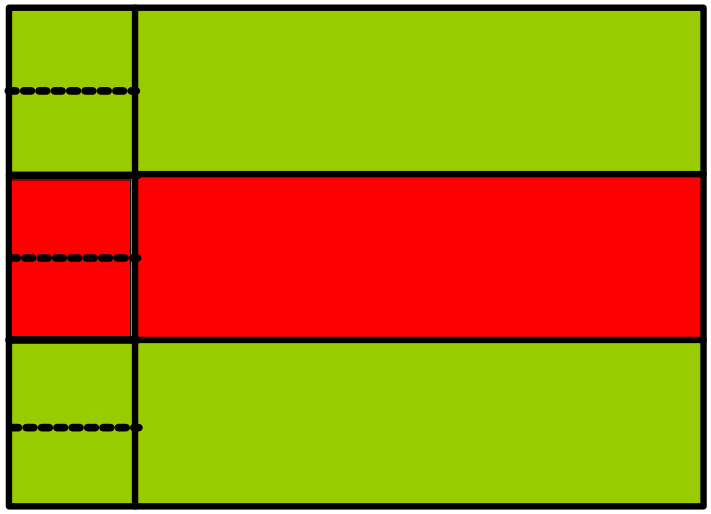
Not fully resolved yet

- Is zero suppression possible?
  - Will be some threshold below which no chance of tower hit
  - Must include noise in the equation

Forward Jet Algorithm Options

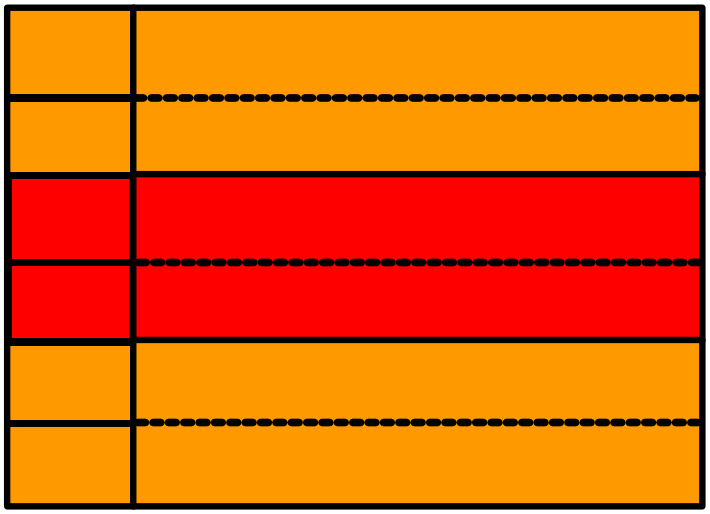
Distinct:

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



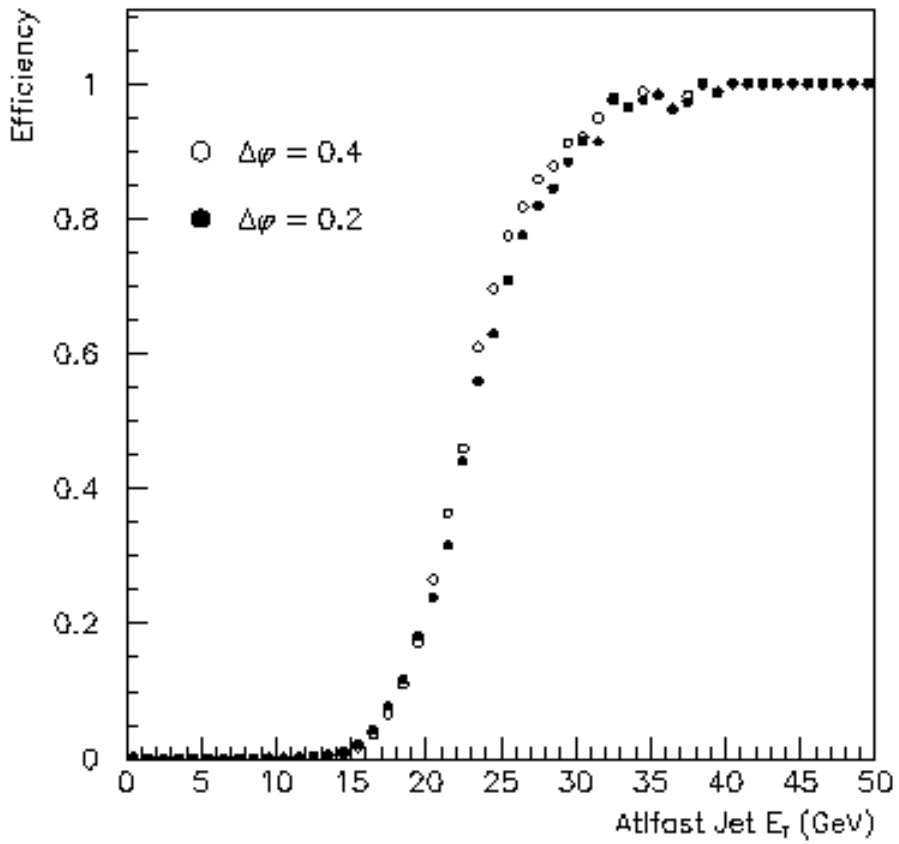
Continuous:

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



Preliminary Forward Jet Performance

Threshold Sharpness



Rates (Forward+Backward)

$\mathcal{L} = 2\times10^{33}\text{cm}^{-2}\text{s}^{-1}$ (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:

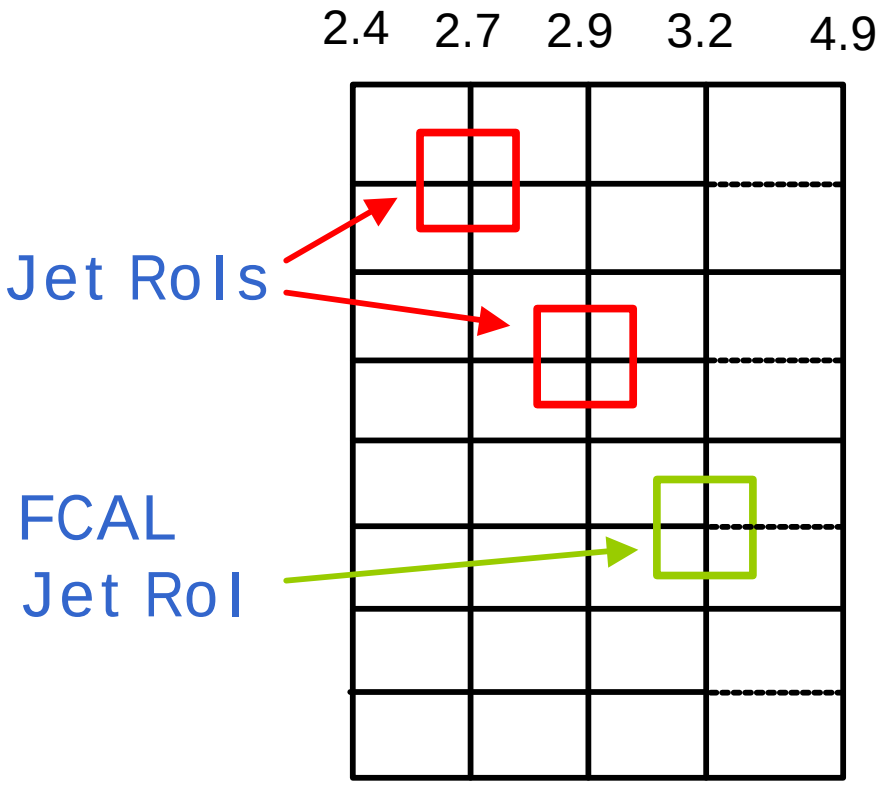
- "Forward" = FCAL

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, but CMM could implement it
  - matching responses of FCAL and central jets an issue?



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