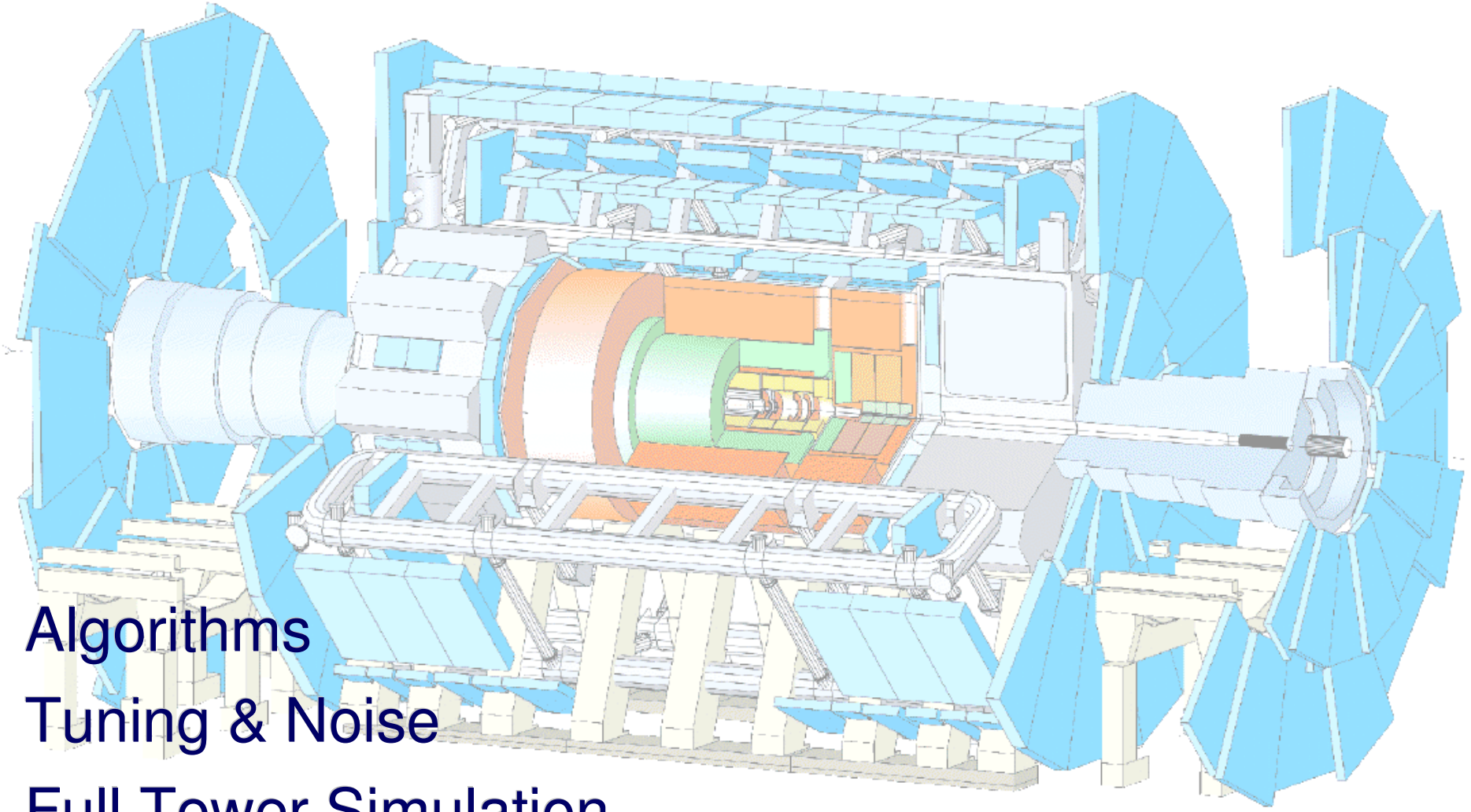
Level 1 Simulation Status



Algorithms

Tuning & Noise

Full Tower Simulation

CP Simulation Status

e/gamma/tau algorithm

- Tested, debugged, validated
  - reported at last joint meeting
- Produces
  - RoIB output (4 Slink words). Also “decoder” methods

RoI Type				One of 0-many CP RoI words					
0	0	0	0	2b C	4b CPM No	3b CP	3b LC	8b electron Thresholds	8b e/tau Thresholds

  - CTP word

Pair 33					Cable 0					Pair 0
6*0	2b R	P	3b Thr8	3b Thr7	3b Thr6	3b Thr5	3b Thr4	3b Thr3	3b Thr2	3b Thr1	0

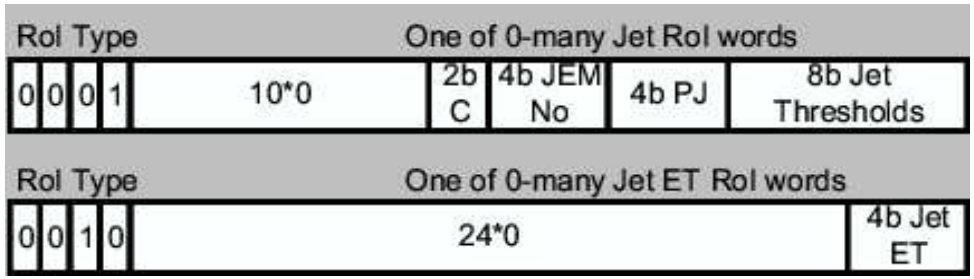
  - RoI objects with additional debug information

JEP Simulation Status

Jet Algorithm

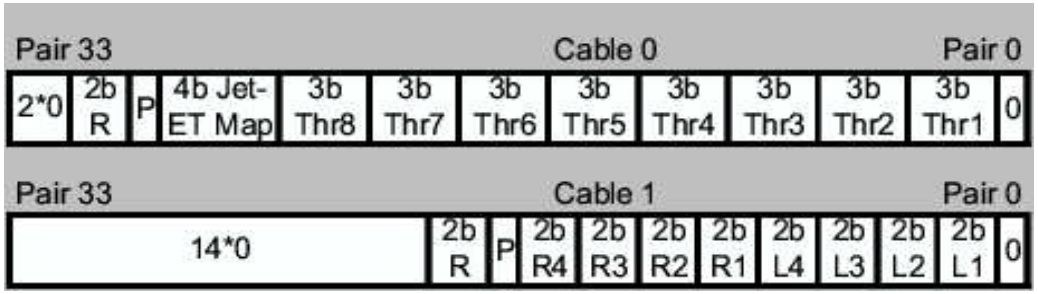
- Tested, debugged
  - Validation delayed by other priorities
  - May still be minor corrections needed
- Produces
  - RoIB output

    (2 Slink words)



  - CTP word

    $JetE_T$ next major release



  - RoI objects with additional debug information

JEP Simulation Status

E_T^{miss}, E_T^{sum} algorithms

- Coded, debugging/validation not started
  - should be functional now
- Produces
  - RoIB output

RoI Type				0 or exactly 3 Energy RoI words		
0	0	1	1	12*0		16b Ex
0	0	1	1	12*0		16b Ey
0	0	1	1	4b ETSum	8b ETMiss Thresholds	16b SumEt

  - CTP word

Pair 33				Cable 0		Pair 0
18*0				2b R	P	4b Sum Et Map	8b EtMiss Hit Map	0

LVL1calo in Common Ntuple

New in 6.0.1

- Allows inclusion of LVL1 trigger in CBNT-based studies
  - much HLT TDR work
- Useful for our own work
  - allow comparison with MC truth and reconstruction

e/γ/τ data

```
L1Em/L1Em_nRoI
L1Em/L1Em_RoIWord
L1Em/L1Em_Core
L1Em/L1Em_EmClus
L1Em/L1Em_TauClus
L1Em/L1Em_EmIsol
L1Em/L1Em_HdIsol
L1Em/L1Em_HdCore
L1Em/L1Em_EmThresh
L1Em/L1Em_TauThresh
L1Em/L1Em_eta
L1Em/L1Em_phi
```

Jet data

```
L1Jet/L1Jet_nRoI
L1Jet/L1Jet_JetRoIWord
L1Jet/L1Jet_ET4x4
L1Jet/L1Jet_ET6x6
L1Jet/L1Jet_ET8x8
L1Jet/L1Jet_Thresh
L1Jet/L1Jet_eta
L1Jet/L1Jet_phi
```

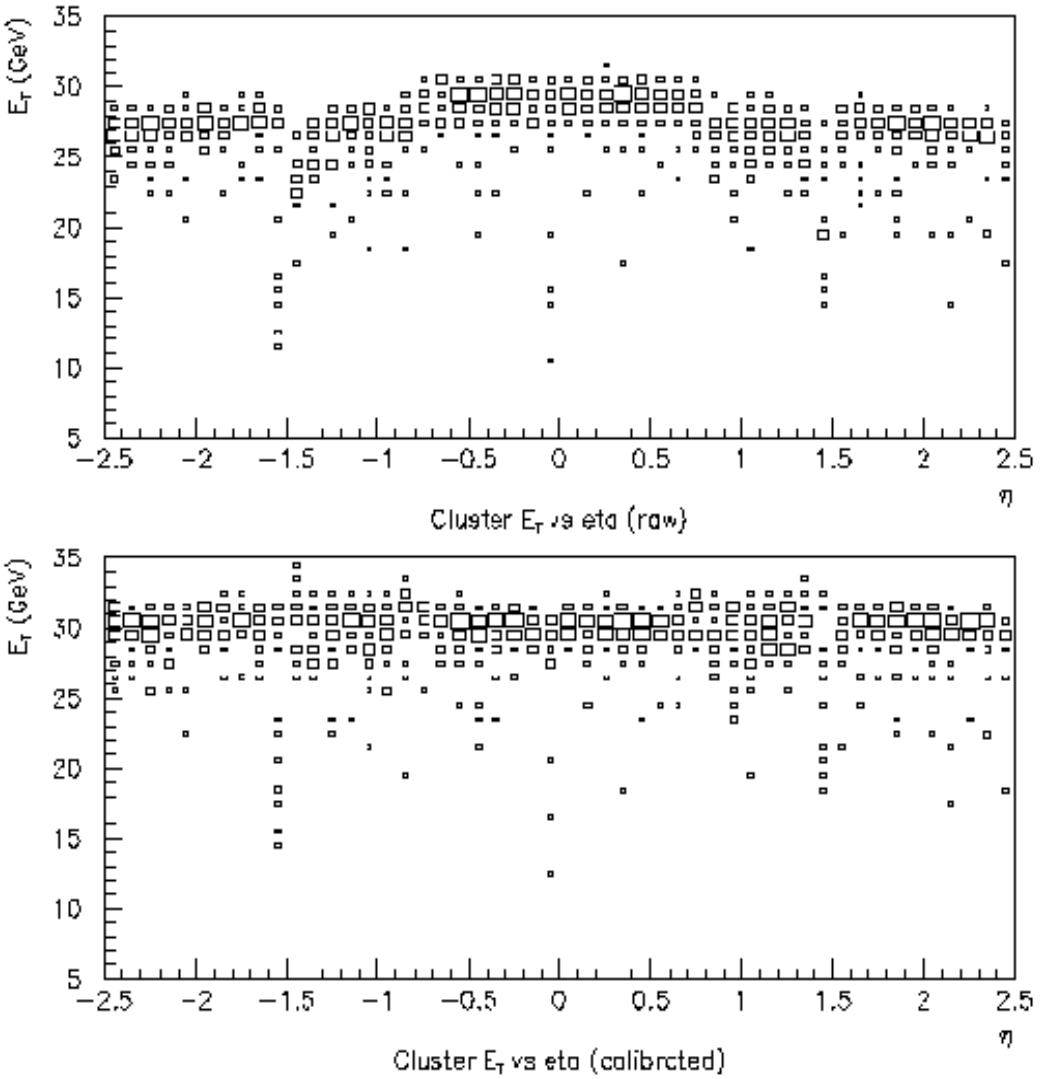
e/gamma Trigger Calibration (DC1)

Material varies strongly with η

- Hence cluster E_T varies also
- Difficult to use for HLT studies

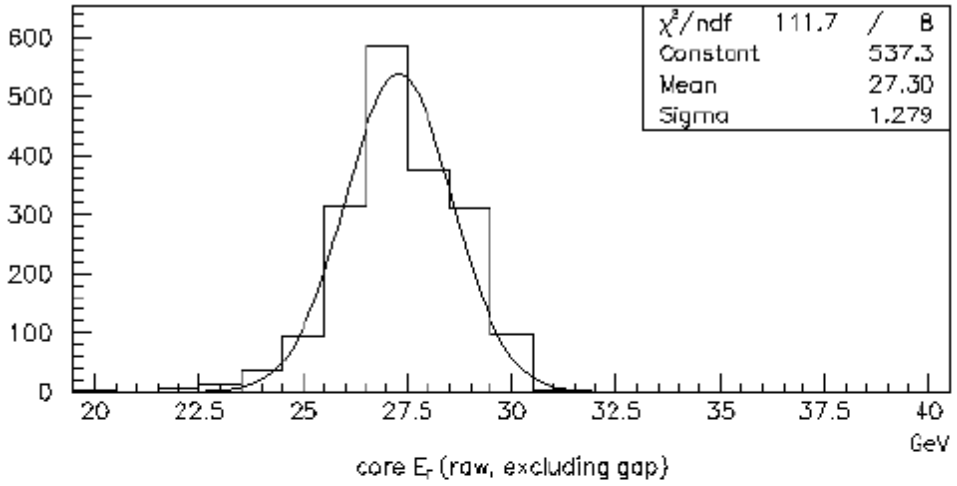
Added simple calibration (6.0.0)

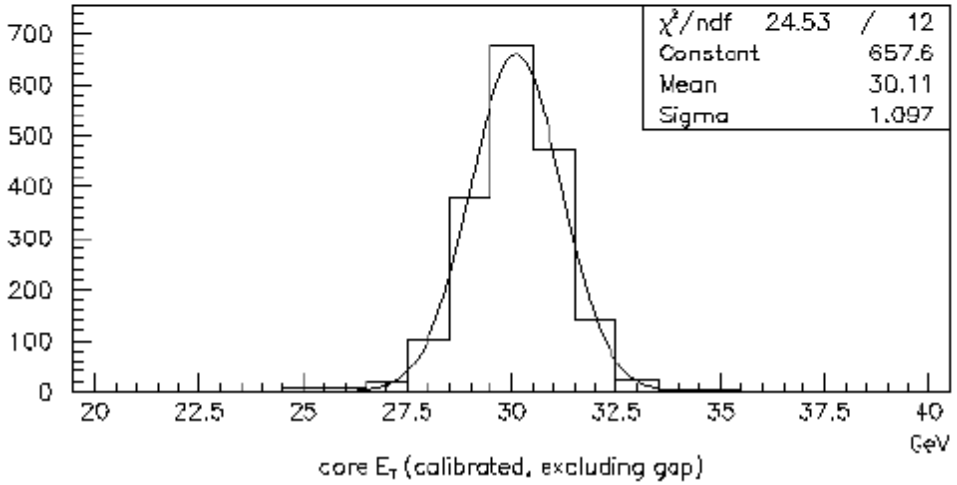
- Single η-dependent factor
- Similar to what existed in Atrig
- Tested in 15-60 GeV E_T range
- Real system could be slightly more sophisticated
  - But can only calibrate towers, not clusters



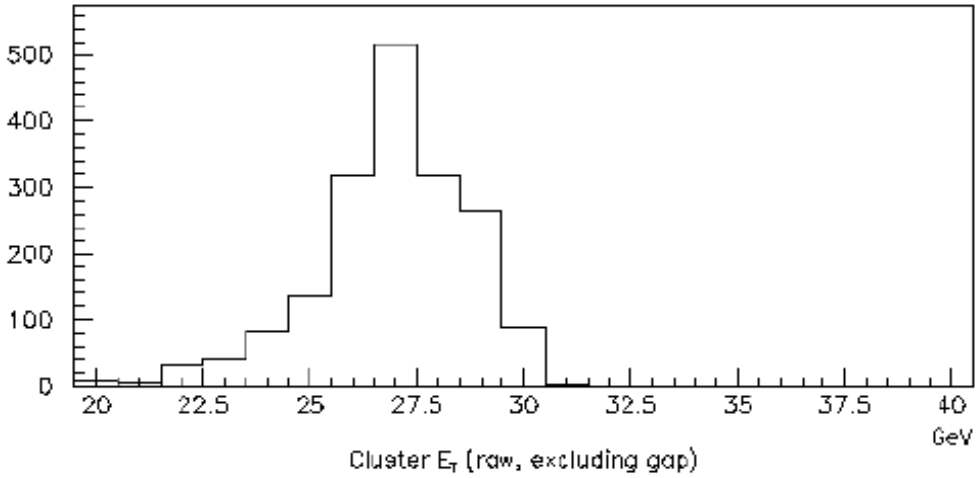
Effect of Calibration (excluding gap region)

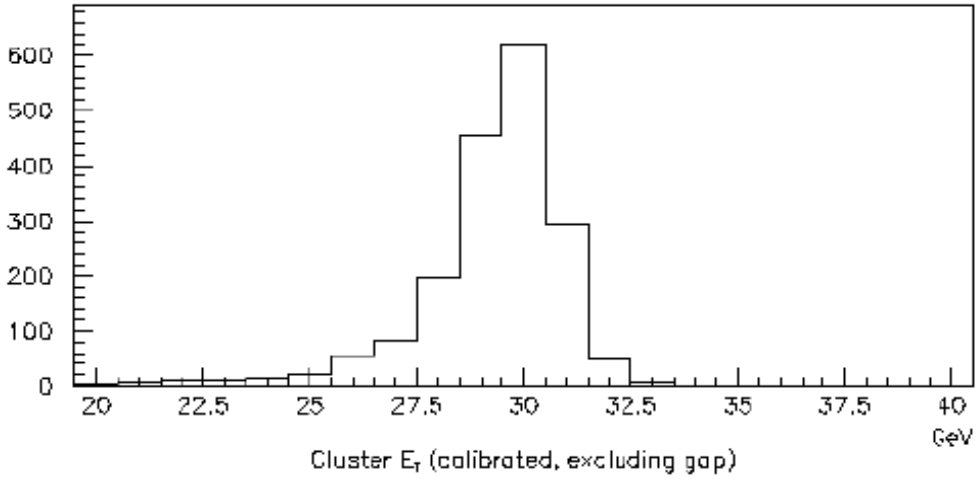
E_T resolution (2×2 core)





Cluster E_T distribution





Noise, Tower Thresholds

LUT Simulation

- Early versions simply truncated E_T to 8 bits
  - LUT can be more sophisticated
  - May be important for low-E_T signals
  - From 6.0.0 includes rounding and non-integer thresholds

Noise

- None at present
  - Very easy to add
  - Adding L1 information to CBNT took precedence

But this is still all with a single time slice

Full Trigger Tower Simulation

Tower Simulation

- Correct allocation cells → towers
  - First time available for all calorimeters
- Pulse profile as a function of time
  - Previously only in ATLFAST
- All analogue noise sources

PreProcessor Simulation

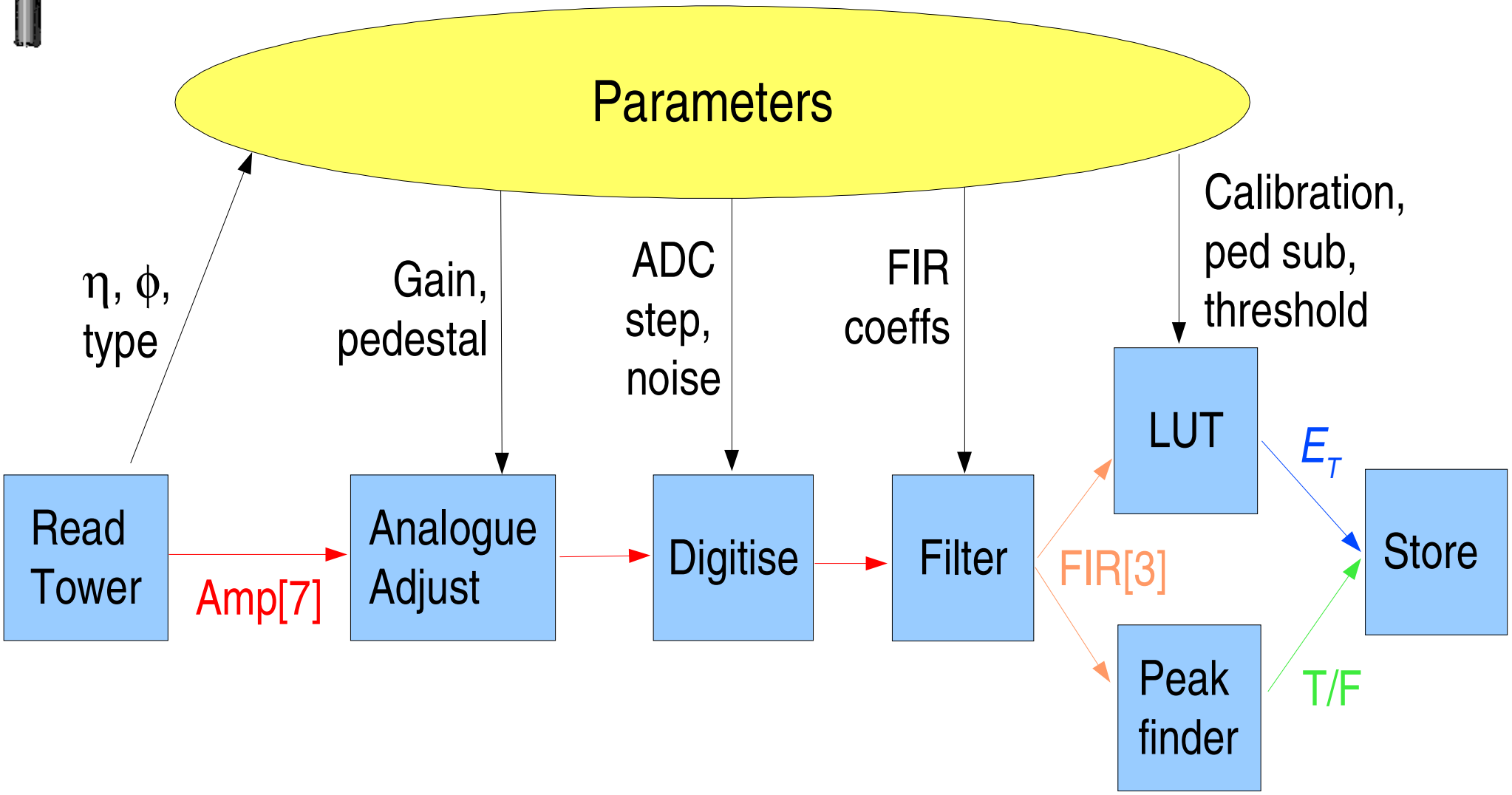
- 10-bit digitisation, including pedestal effects
- FIR-filter based BCID, with correct precision & constraints
- Correct simulation of calibration LUT

Status of Tower Simulation

First Prototype Calorimeter Towers Available

- Very preliminary LAr towers in 6.0.0
  - no FCAL, some interface features absent
- Tile tower prototype immenant
  - may even be released by time I give ths talk
- L1 PreProcessor features designed
  - (Simple) code for most functions written
  - Initially choose simplest integration with `TriggerTowerMaker`
  - Consider future redesign when writing code

Tower Processing (Ultimate)



Features of (very) preliminary LArTTL1

LArTTL1 methods:

- LArTTL1::ttChannelID()
  - electronic channel ID
- LArTTL1::ttID()
  - “logical identifier” of channel
  - basis for eta/phi identification
- LArTTL1::nsamples()
  - Initially 5 (7 requested)
- LArTTL1::samples()
  - vector of doubles. Analogue pulse heights

Access em and had separately:

- via ttL1ContainerEm & ttL1ContainerHad

Status of PreProcessor Simulation

Code fragments exist for signal processing tasks:

- Digitisation, FIR filter, peak-finding, LUT
  - including pedestals, FIR coeff. setup, noise

Producing `TriggerTowers` straightforward

- Simply plug another method into `TriggerTowerMaker`
  - best chance of an early implementation for *B* trigger studies

Still to write interface to LArTTL1/TileTTL1

- Start after this meeting
- Need to implement more functionality in towers
  - but will work with whatever we have

Where are we?

Mostly ready for HTL TDR

- *e*/γ/τ algorithms ready
  - including validation, calibration
- jets working
  - awaiting validation
- common ntuple includes *e*/γ/τ & jet
  - committed Tuesday

Full Tower Simulation "emerging"

- Preliminary tower simulations exist
- Preliminary PPr sim soon
- Target = get something for Physics Workshop *B* studies