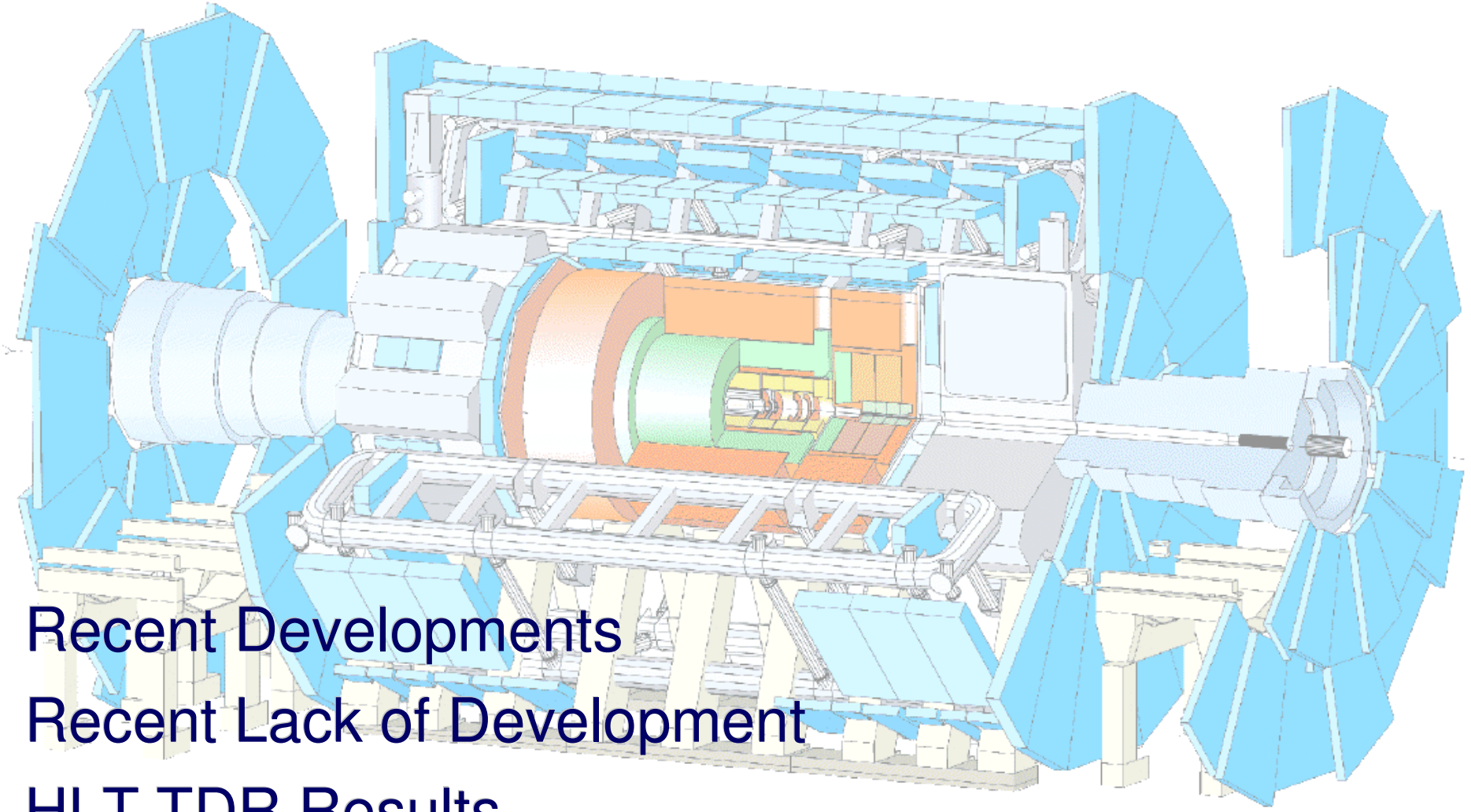
Simulation Status and Rate Update



Recent Developments

Recent Lack of Development

HLT TDR Results

Software Developments

Suite of Algorithms Growing (Ed)

- now includes E_T triggers & forward jets

Updates to Tower Simulations (Alan)

- tower sum noise added

Keeping up with other packages (both)

- one of the biggest demands on developers!

And a little bit of bug-fixing

- the "-ive E_T RoI bug" was instructive
  - odd, rare effect seen with pileup revealed subtle logic error

Tower Simulations

Much less progress than hoped

- Tower objects exist
- am able to read them
- decoding identifiers → coordinates not simple
  - much help from Fabienne
  - think I'm close
  - but now pushed aside by other demands

Performance Studies for HLT TDR

A division of labour has evolved

- Ed handling threshold plots
- Alan producing rate estimates

Rate Studies

- Base on Common Ntuple, default tunings/tower parameters
- Datasets: single electrons, $Z \rightarrow e^+e^-$, dijets
  - with pileup ($2*10^{33}$, 10^{34}), calorimeter & tower noise
- Write Root classes to analyse

Cut tuning – Inclusive Triggers

Use single electron samples

- Statistics better than $Z \rightarrow e^+e^-$

Identify possible isolation cuts

- 3 isolation variables to combine
  - consider tight sets ($\varepsilon \approx 95\%$) and looser (97-99%)

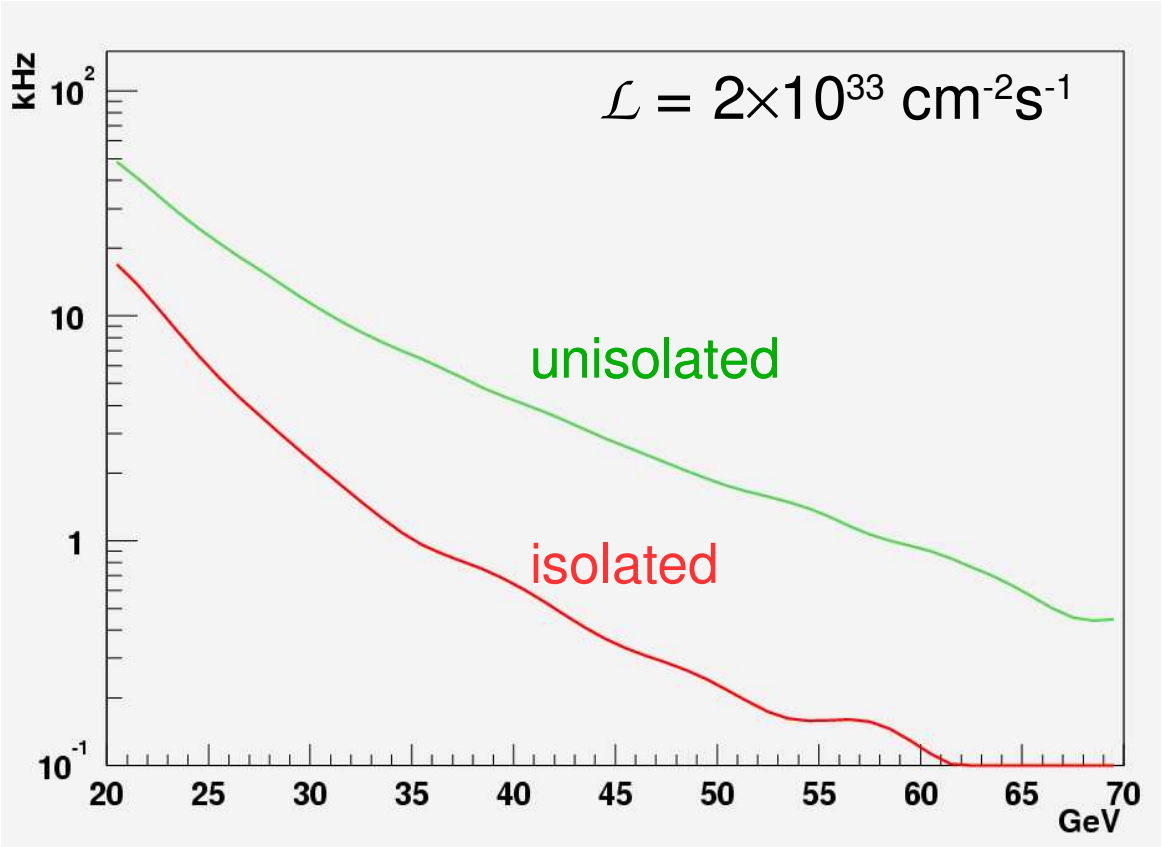
Choose corresponding cluster thresholds

- select events in fiducial region
  - exclude barrel-endcap transition
- choose thresholds for 95% efficiency
  - typically lower for tight isolation, higher for looser

Rate Estimation – Inclusive Triggers

For each threshold/isolation set

- Calculate fraction of dijets passing isolation vs cluster E_T
- Scale by:
  - L×σ/filter rejection
- Shift $E_T \rightarrow p_T$
  - from threshold cuts
- Choose isolation giving best rate



Inclusive Rates – DC1 Data

Low Luminosity

Isolation $E_T \leq (3,2,2)$ GeV

- Rate for EM20I = 17 kHz
  - L1 TDR $\Rightarrow$ 21 kHz
- Rate for EM25I = 5.3 kHz
  - L1 TDR $\Rightarrow$ 10 kHz
  - different isolation cuts give 6-7 kHz

Design Luminosity

Isolation $E_T \leq (5,2,2)$ GeV

- Rate for EM30I = 23 kHz
  - L1 TDR $\Rightarrow$ 22 kHz

Comments:

- Tower thresholds not optimised (should not be same for both $\mathcal{L}$)
- May be some changes with full tower simulation.

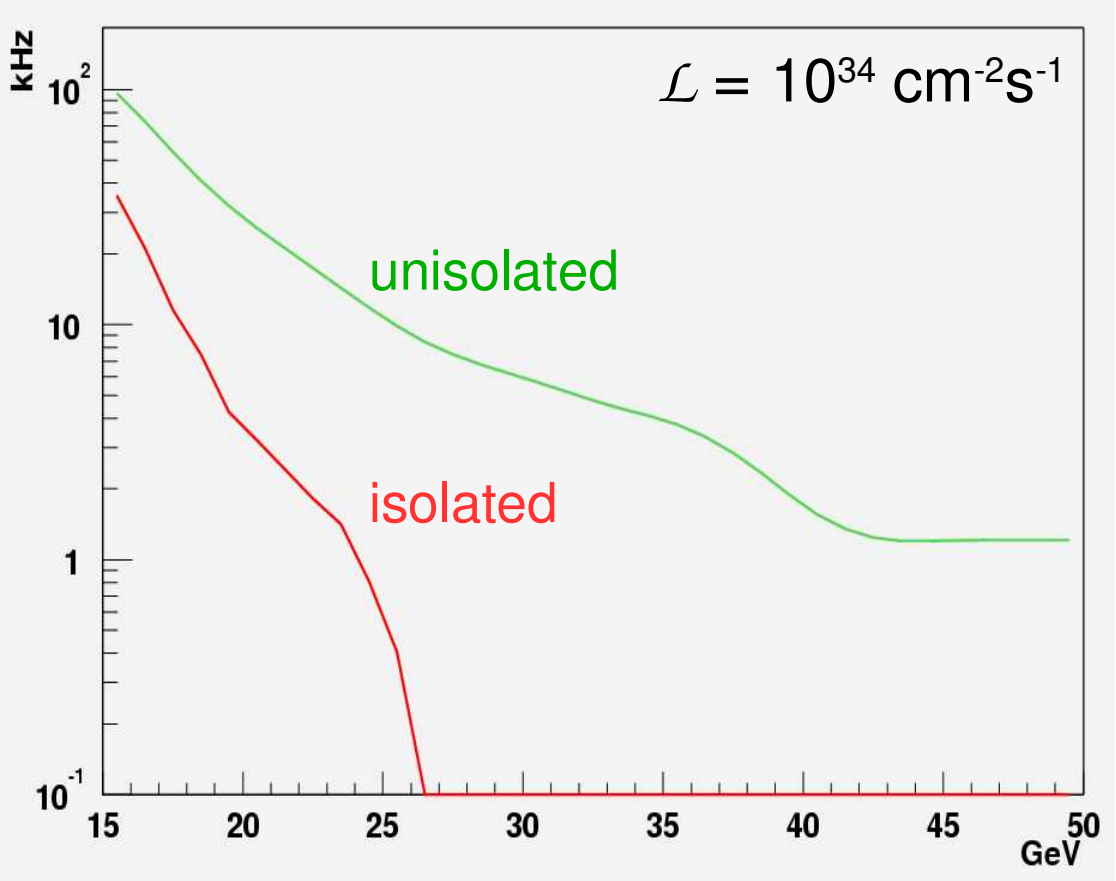
Pair Rates (Preliminary)

Similar Procedure

- Isolation efficiency > 97.5%/electron
  - pair efficiency > 95%
- Cluster+Isolation > 95%
  - pair rarely have same p_T

Rates

- 2×10^{33}: 2EM15I ≈ 2 kHz
- 10^{34}: 2EM20I ≈ 3-4 kHz
- Slightly better than L1 TDR



Do we have enough thresholds?

Why ask this again? A parting shot from Thomas:

- CTP will produce deadtime
  - too close to last triggered event, ROD busy,.....
- Define “high-priority” triggers which override
  - which will be selected nevertheless
- Must be lower rate than standard triggers
  - so higher p_T (also more interesting for physics)
- May be additions to previously considered trigger menu
  - hence this question comes back again...

Is this a real problem?

Maybe:

- Menu in Thomas/Stefan's draft note uses 5 inclusive em thresholds
  - 3 “discovery motivated”, 2 “high priority”
- Does not consider loosening isolation as end in itself
  - I've usually budgeted 3 inclusive thresholds for this purpose
- Have doubts about 3 “discovery motivated” thresholds
  - using resources just to tell LVL2 the ET of the object
- Need to discuss further
  - also suggests several prescaled thresholds
  - awaiting reply to my email...