Level-3 Trigger Farm CPU Requirements

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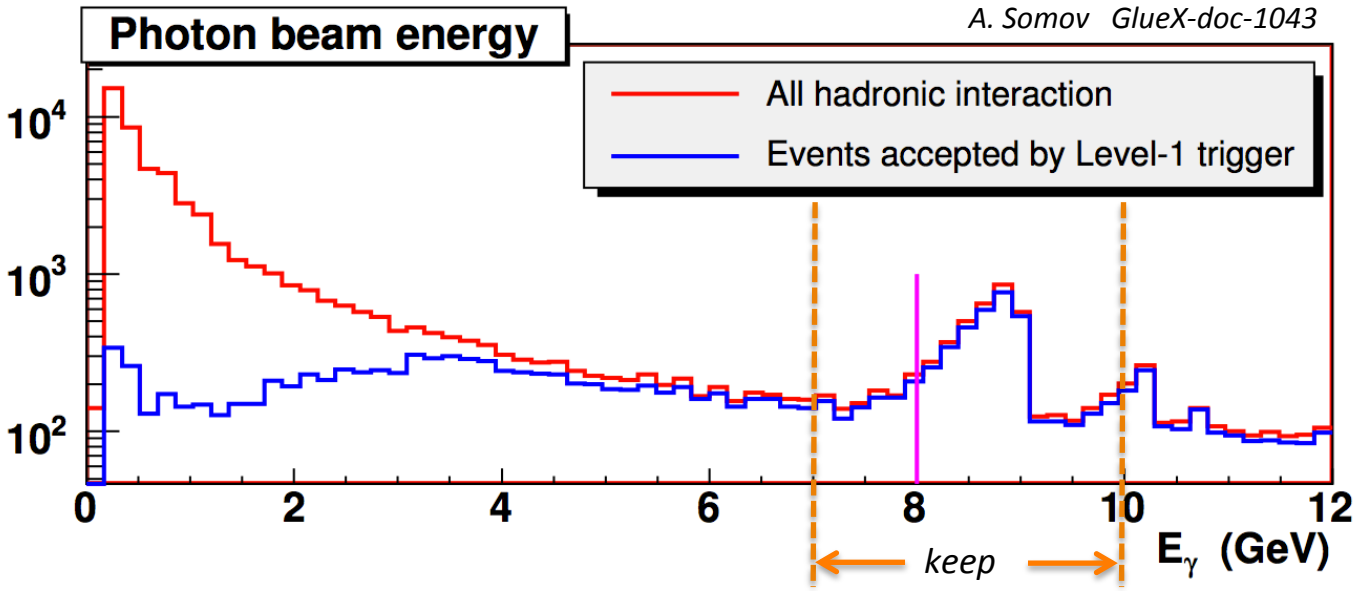
L3 trigger goal

- Remove ~90% of events that pass Level-1 trigger (possible?)
  - Cut events with energies less than ~7GeV or greater than ~10GeV



Method

- List below provides inputs that could be used to determine the accept/ reject state of the L3 trigger:
  - Definitely accept
  - Definitely reject
  - Default accept
- Some values take much more CPU to obtain
  - Quick decisions will be tested first and expensive ones only if they fail to provide a definitive answer
- For current study, all values are calculated indicating worst-case scenario for CPU requirement

```
// Add data members here. For example:
  int Ntagger;              // Number of reconstructed tagger hits
  int Nstart_counter;       // Number of start counter hits
  int Ntof;                 // Number of TOF hits
  int Ncdc_layers;          // Number of different CDC layers hit
  int Nfdc_planes;          // Number of different FDC planes hit
  int Nfdc;                 // Number of FDC hits (cathode + anode)
  int Nfdc_pseudo;          // Number of FDC pseudo hits
  int Ncdc;                 // Number of CDC hits
  int Ntrack_candidates;    // Number of track candidates
  int Ntrack_wb;            // Number of wire-based tracks
float Ptot_tracks_wb;       // Scaler sum of total momentum from wire-based tracks
  int Nbcal_clusters;       // Number of BCAL clusters
  int Nfcal_clusters;       // Number of FCAL clusters
float Ebcal;                // Total energy in BCAL (rough estimate)
float Efcal;                // Total energy in FCAL
 bool L3good;               // true if event passes L3 trigger
```

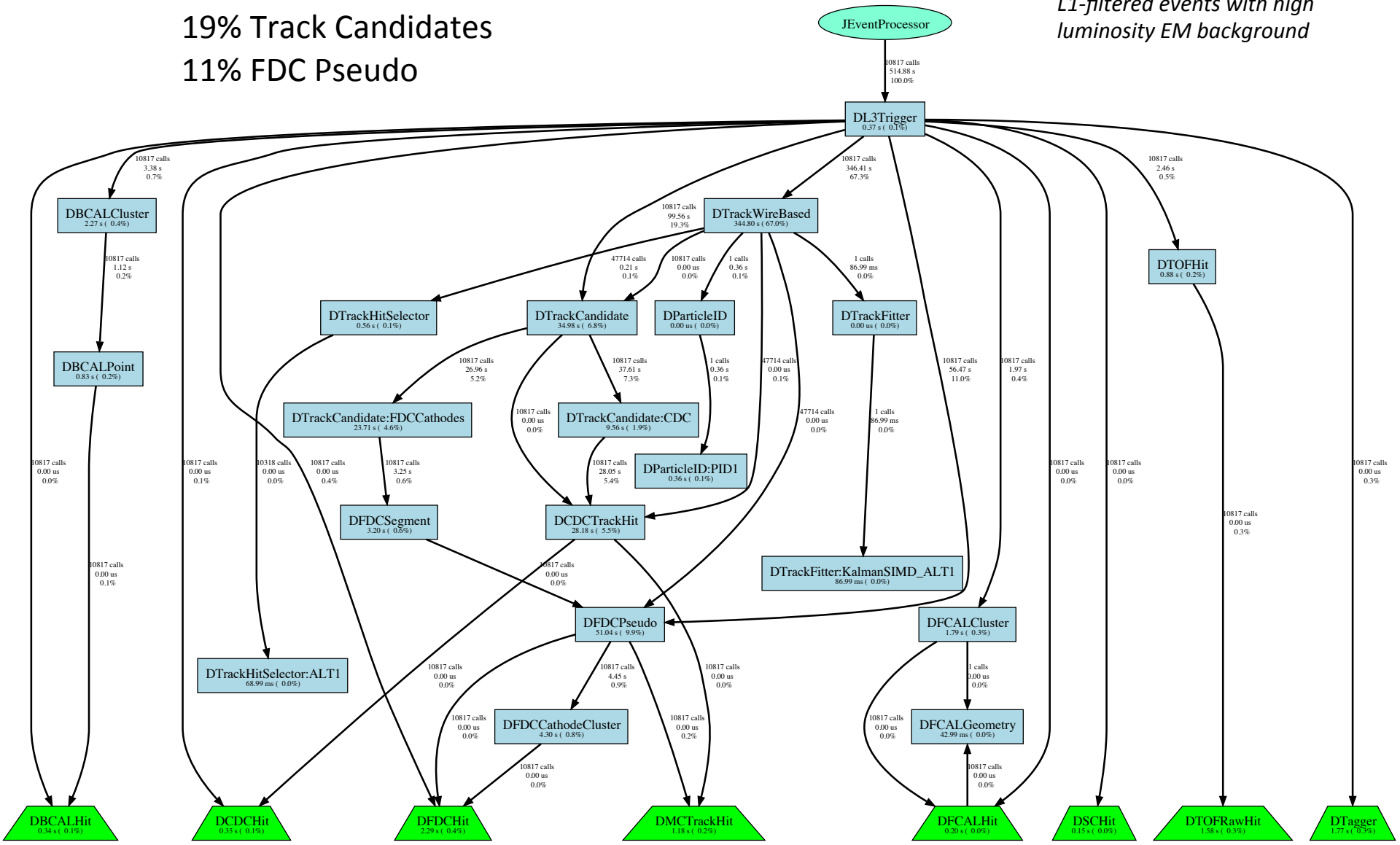
Most expensive algorithms

67% Wire-based tracks

19% Track Candidates

11% FDC Pseudo

based on 10.8k pythia-generated, L1-filtered events with high luminosity EM background



Results Summary

- Single core processing rate: 22Hz per core
  - (106Hz per 5cores)
- Without wire-based tracking rate is 3x higher
- To handle 20kHz low-luminosity trigger rate we would need ~910 cores (20kHz/22Hz)
  - 29 boxes with 32 cores
    or
  - 15 boxes with 64 cores
- Without wire-based tracking we would need only ~303 cores
  - 10 boxes with 32 cores
    or
  - 5 boxes with 64 cores
- Project has $39k for L3 farm equipment infrastructure