TPC online reconstruction Cluster Finder & Conformal Mapping Tracker

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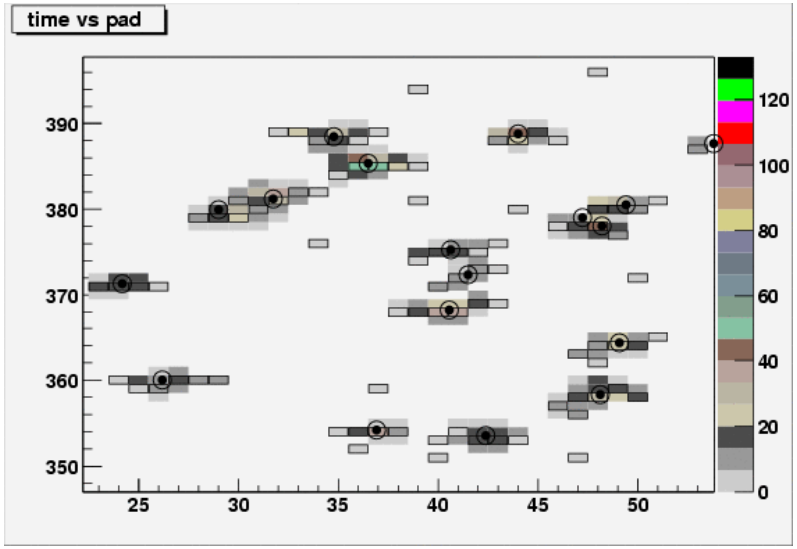
Outline

- Cluster Finder (CF) algorithm principle
- Conformal Mapping (CM) Tracker principle
- Update on performance
- Goals for the next run

Cluster Finder

- ADC sequences above threshold as input
- Simple sequence matching between neighbouring pads
- Centroids calculated as weighted mean of ADC values
- Assigned 3D coordinates (pad, row, time)

Deconvolution scheme:
split clusters at local minima of charge distributions along time and pad direction



Conformal Mapping Tracker

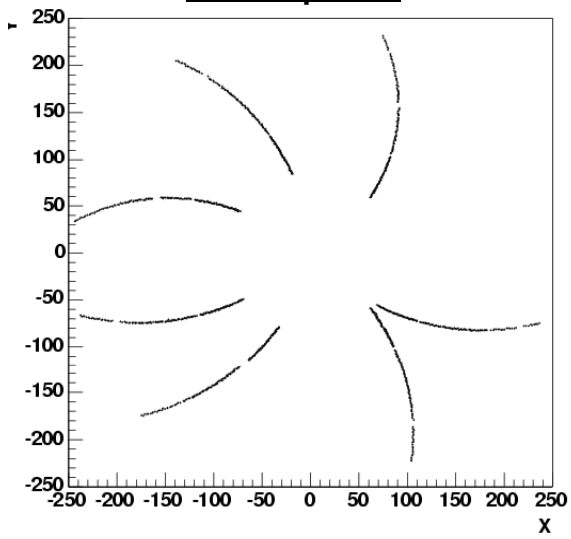
- 3D space points as input
- Conformal mapping

$$x' = \frac{x - x_v}{r^2} \qquad y' = -\frac{y - y_v}{r^2}$$

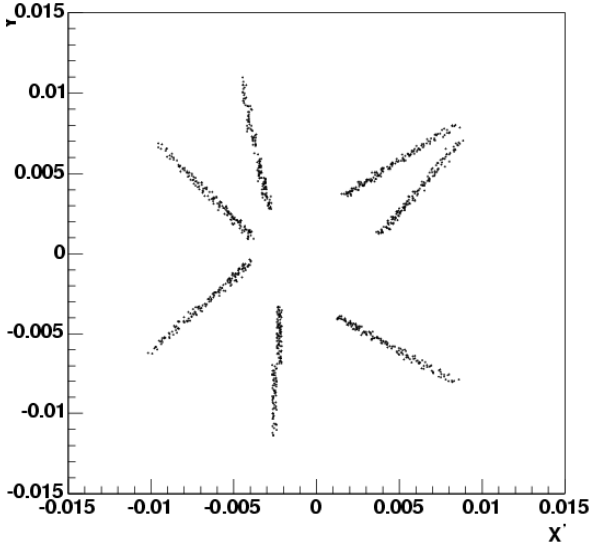
$$r^2 = (x - x_v)^2 + (y - y_v)^2$$

- Build tracks from outer to inner TPC-radius

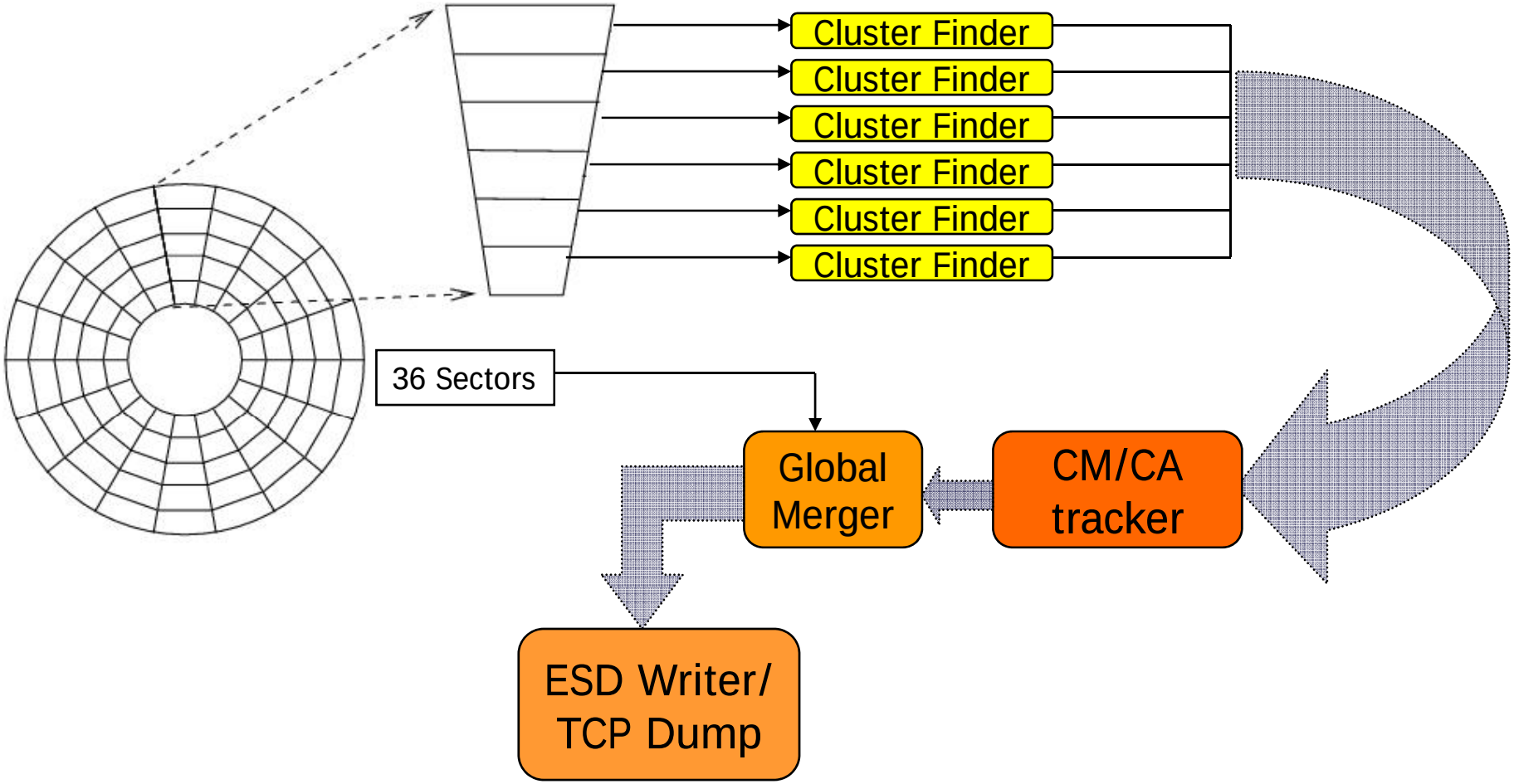
real space



conformal space



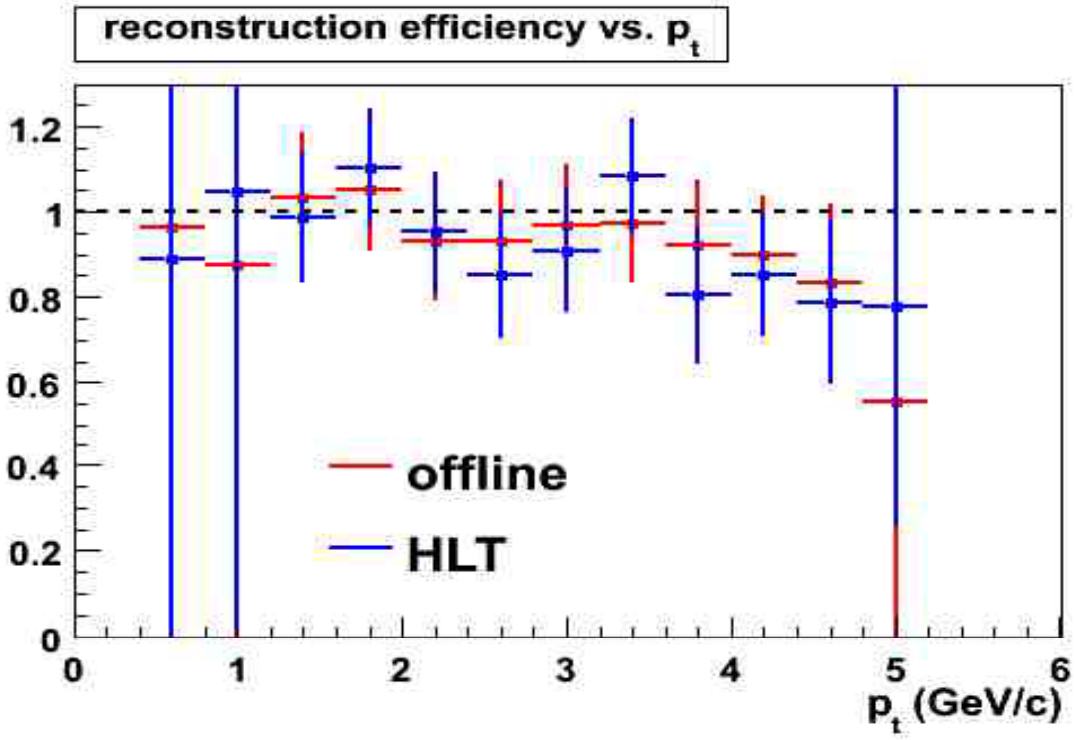
Online HLT Tracking – Dataflow



HLT efficiency vs. p_t

Overall efficiency for primaries :

- HLT: 95%
- Offline: 94%



Benchmarks on HLT cluster

100 Pythia events in multiple loops (300 Mevts)

- CF for 18 sectors (side C) using new decoder
- TCP Dump
- Cluster Finder: ~980 Hz
- Tracker: ~200 Hz

Learning curve...

After two cosmics runs:

- Code cleaning and debugging
- Stable run of CF (and CM)
- Significant improvement of CF speed
- Application of noise filter to increase efficiency
- Extensive analysis chain tests on HLT cluster