FinalTrackSelector For Cosmics: CosmicTrackSelector

Kevin Burkett, Yanyan Gao*

Fermilab

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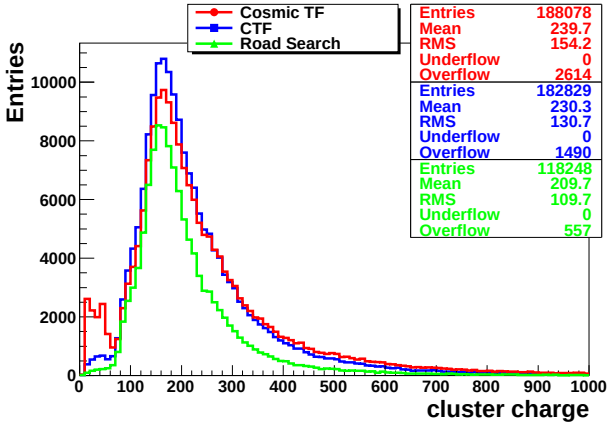
CMS Tracking POG Working Meeting

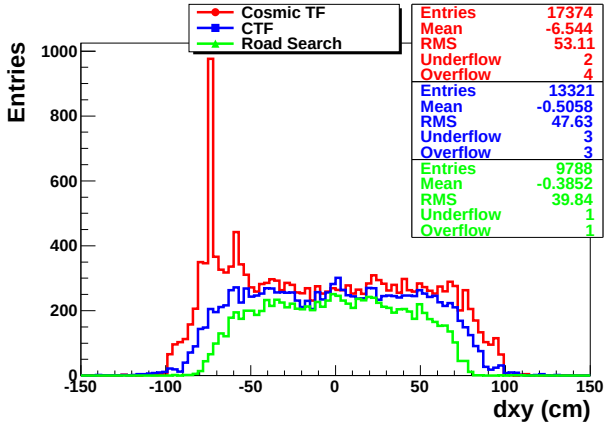
Outline

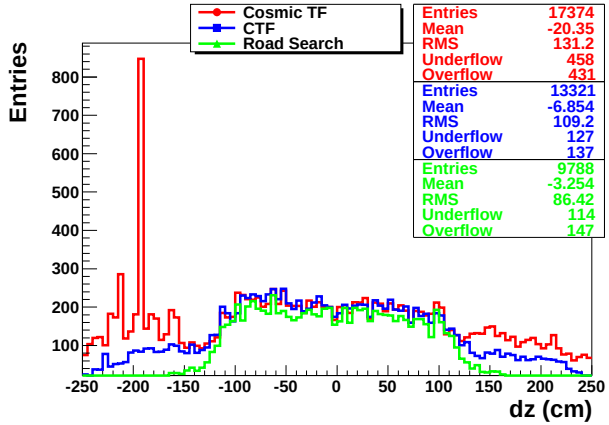
- Motivation and CMSSW implementation
  - Provide a loose quality cut on the cosmic tracks
  - CMSSW implementation: packages and tags
- Performance on efficiency and fakerate in MTV
- Performance on track parameters in CRAFT09 data

Motivation and CMSSW Implementation

- Remove potential fake track, e.g. from TEC noise in CRAFT09







- Proposed cuts on the final track

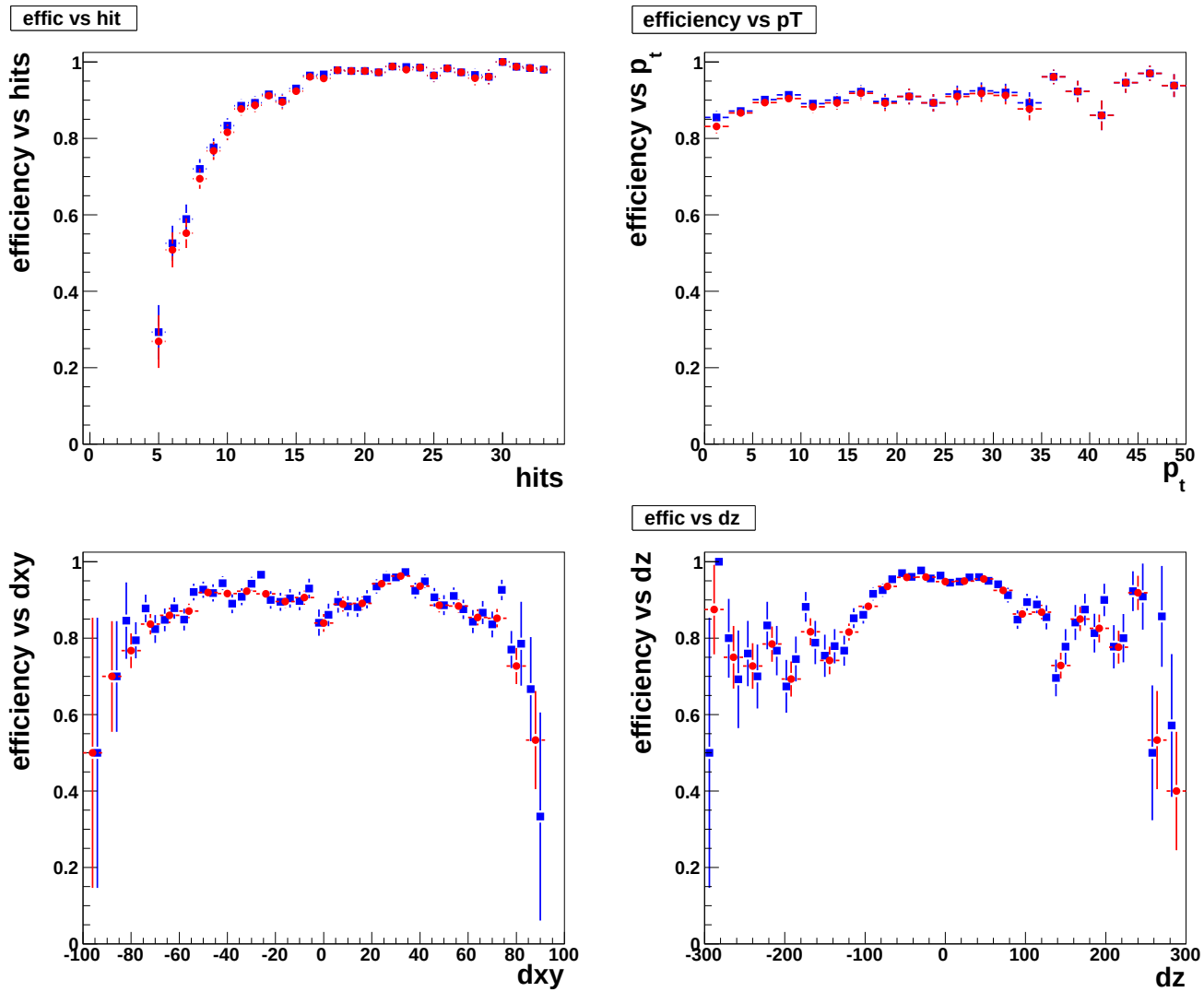
$$|d_{xy}|<=100\ \mathrm{cm} \quad |d_z|<=300\ \mathrm{cm} \quad |\eta|<=2.0 \quad p_T>=1.0\ \mathrm{GeV} \quad \mathrm{nHit}>=5 \quad \chi^2/\mathrm{dof}<=10$$

- CMSSW implementation
  - V00-18-14 RecoTracker/FinalTrackSelectors: New module CosmicTrackSelector added
  - V00-09-10 RecoTracker/Configuration/: CosmicTrackSelector added in tracksP5 sequence
  - V06-00-05 RecoTracker/TrackProducer: TrackProducer output modules renamed
- The changes are ready for 330-pre2 release

Effect on Efficiency in MC

- Data sample: 10K private 31X MC events, reTracking done in 325
  - Cut on TP: $|d_{xy}|$<=110 cm $|d_z|$<=300 cm $|\eta|$<=2.0 p_T>=1.0 GeV nHit>=5

— TrackCollection with CosmicTrackSelector — Original PR TrackCollection reTracking in 325



- Efficiency drop is small

Effect on Fakerate in MC

- Data sample: 10K private 31X MC events, reTracking done in 325
  - Cut on TP: $|d_{xy}|$<=110 cm $|d_z|$<=300 cm $|\eta|$<=2.0 p_T>=1.0 GeV nHit>=5

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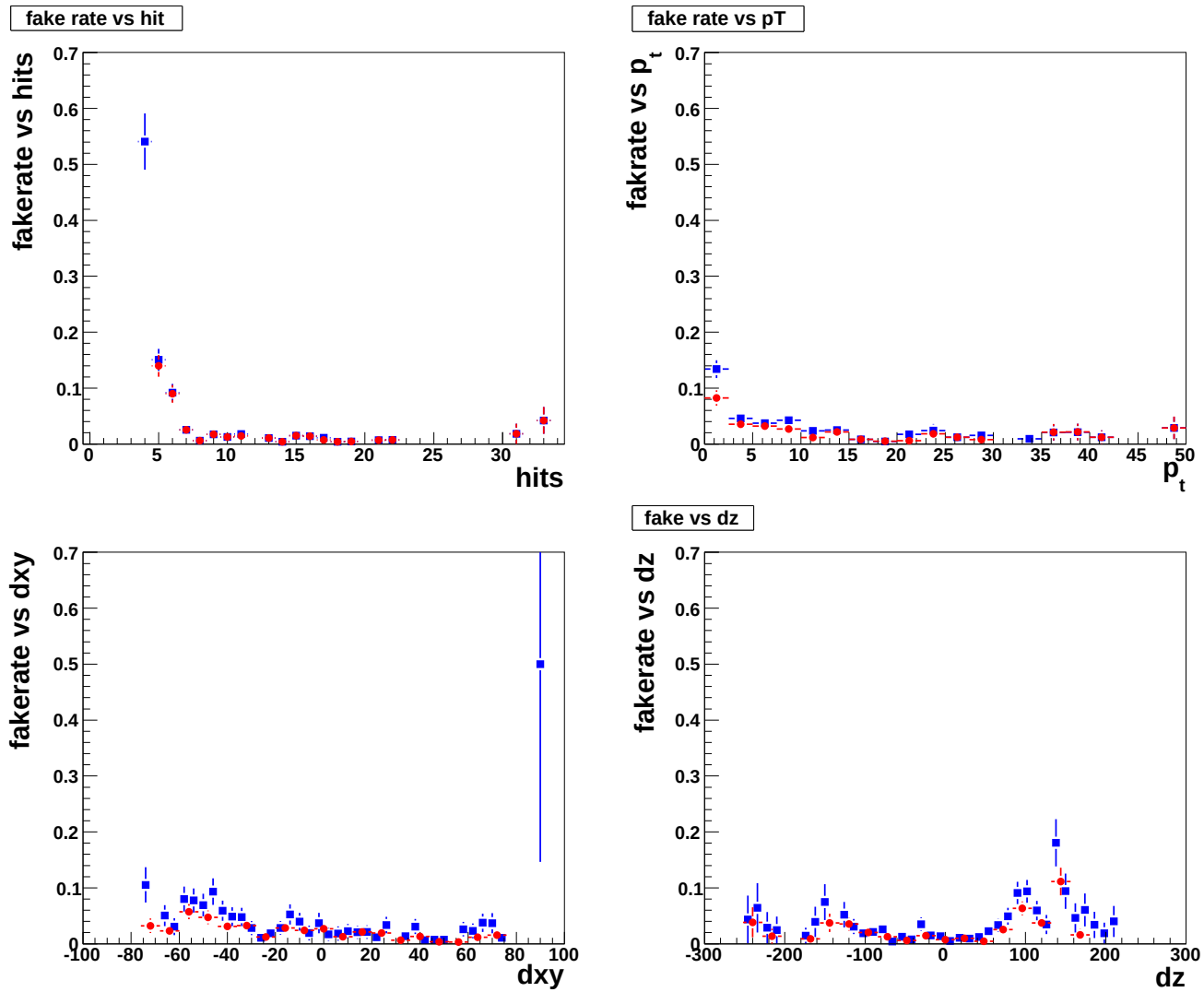


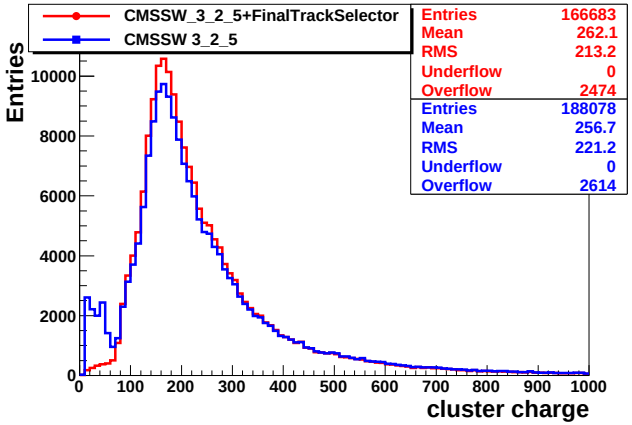
- Fakerate decreases signficantly in low p_T/few nHit region

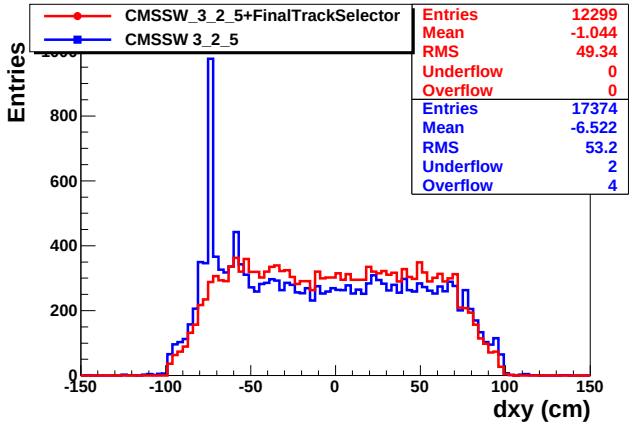
Effect on CRAFT09 - Run 109468

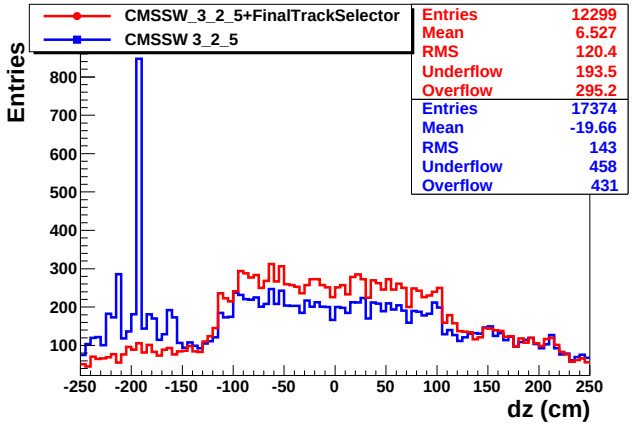
- The spikes in d_{xy}, d_z for CosmicTF are mainly from TEC noise

— TrackCollection with CosmicTrackSelector — Original PR TrackCollection reTracking in 325

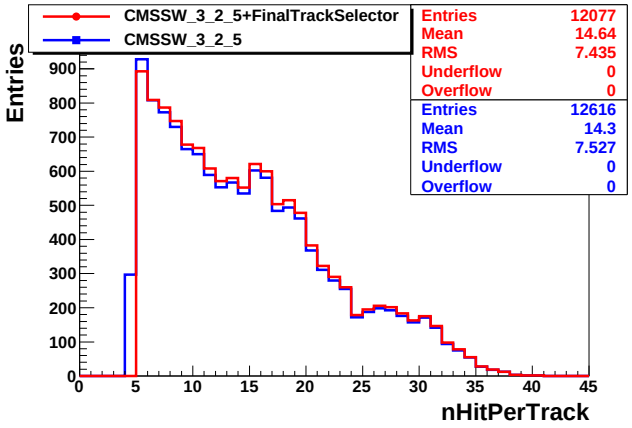
-CosmicTF

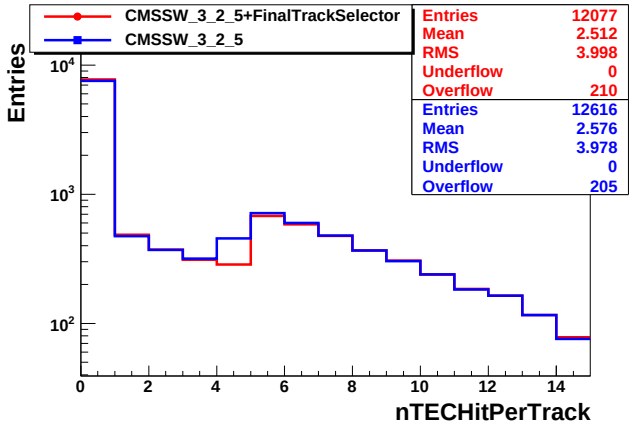


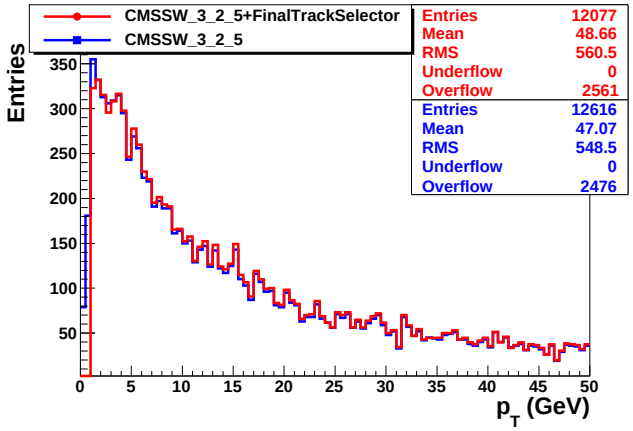




-CTF







- CosmicTrackSelector is efficient removing fake/noisy tracks

Summary

- A final track selector CosmicTrackSelector is created
  - Applies only to the final CTF, CosmicTF, and RS collections
  - CMSSW implementation is finished, ready to go in 330-pre2

- Validation of this change done on 10K MC events
  - Efficiency drop slightly
  - Fakerate drop significantly in low p_T and few nHit region
  - Overall we lose 2% (CTF), 9% (CosmicTF) and 10% (RS)

- Validation of this change checked in CRAFT09 data
  - It removes most of the fake tracks from noisy hits