



Trigger Performance

- Overview
- Recent progress
- Tasks

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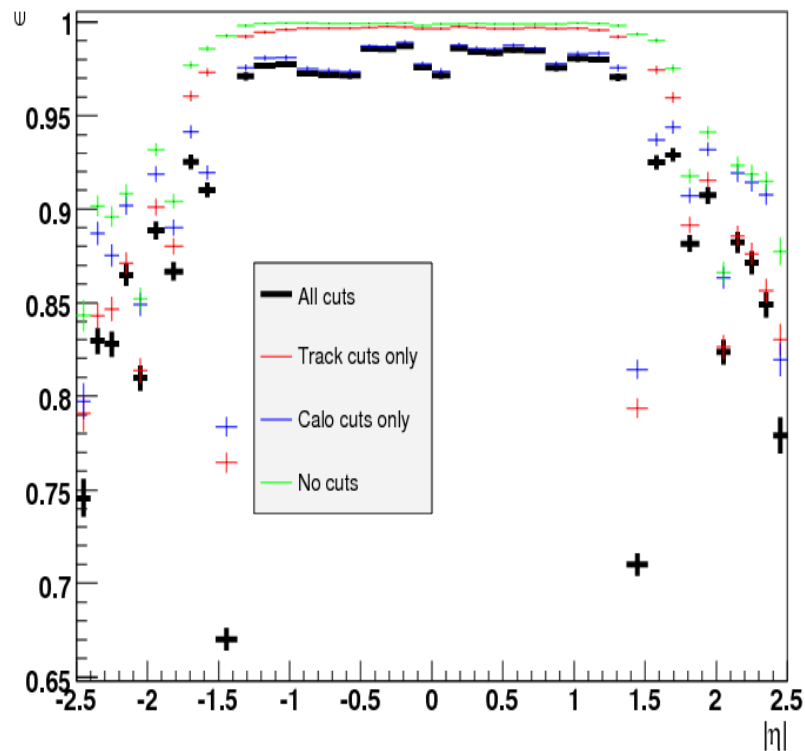
Overview – ATLAS-wide activities

- Online integration & commissioning
- Trigger menus
- Performance optimization
 - Timing, rates, efficiencies, memory leaks, bugs

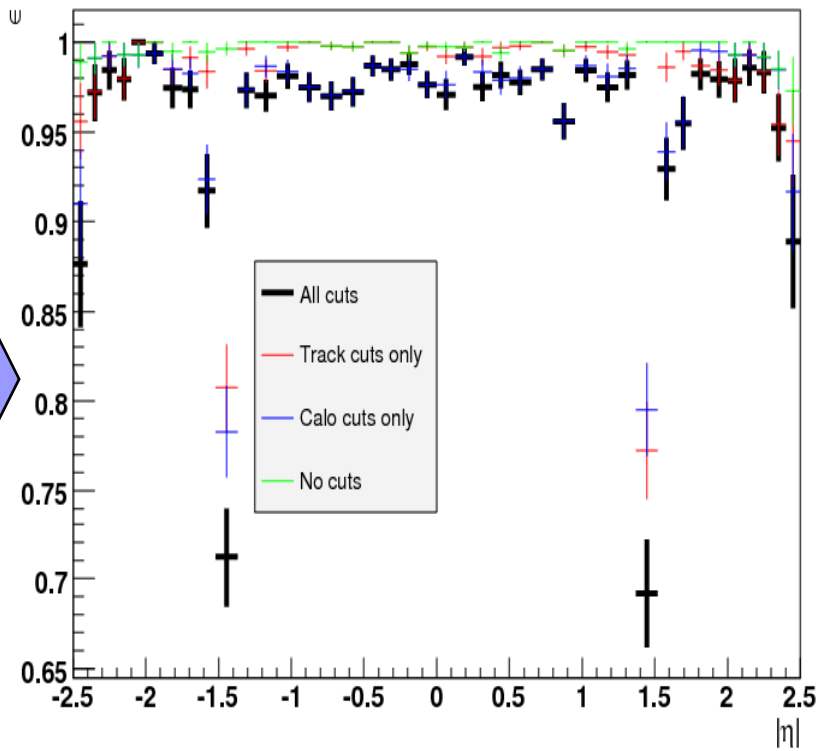
Performance optimization & monitoring
are in the scope of ARTEMIS

Fix for End-cap SCT Spacepoints

L2 efficiency



L2 efficiency



- Identified & fixed bugs in OnlineSpacePointTool, which provides the SCT spacepoints that are input to IDScan.

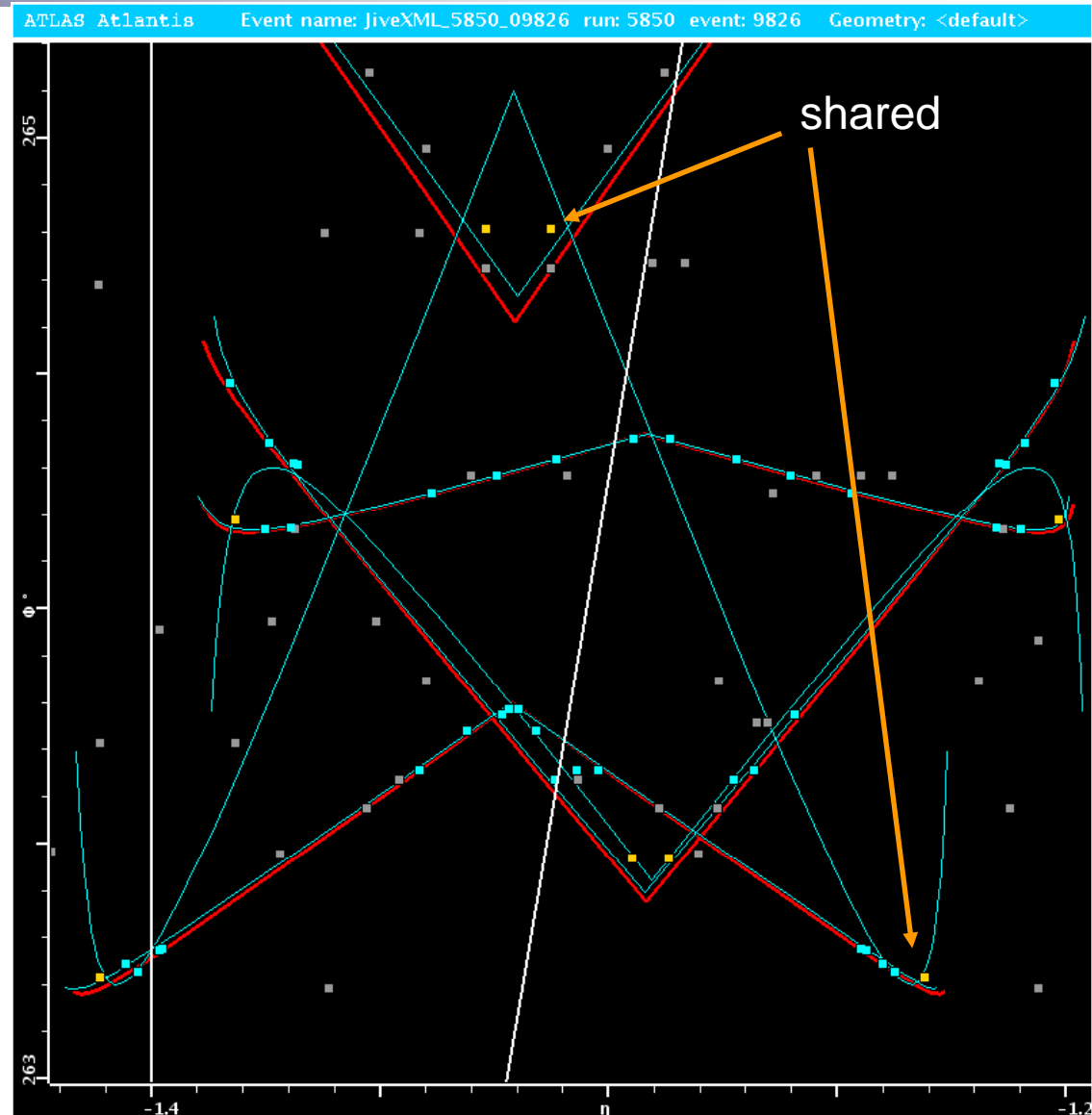
Fake track removal

■ Before

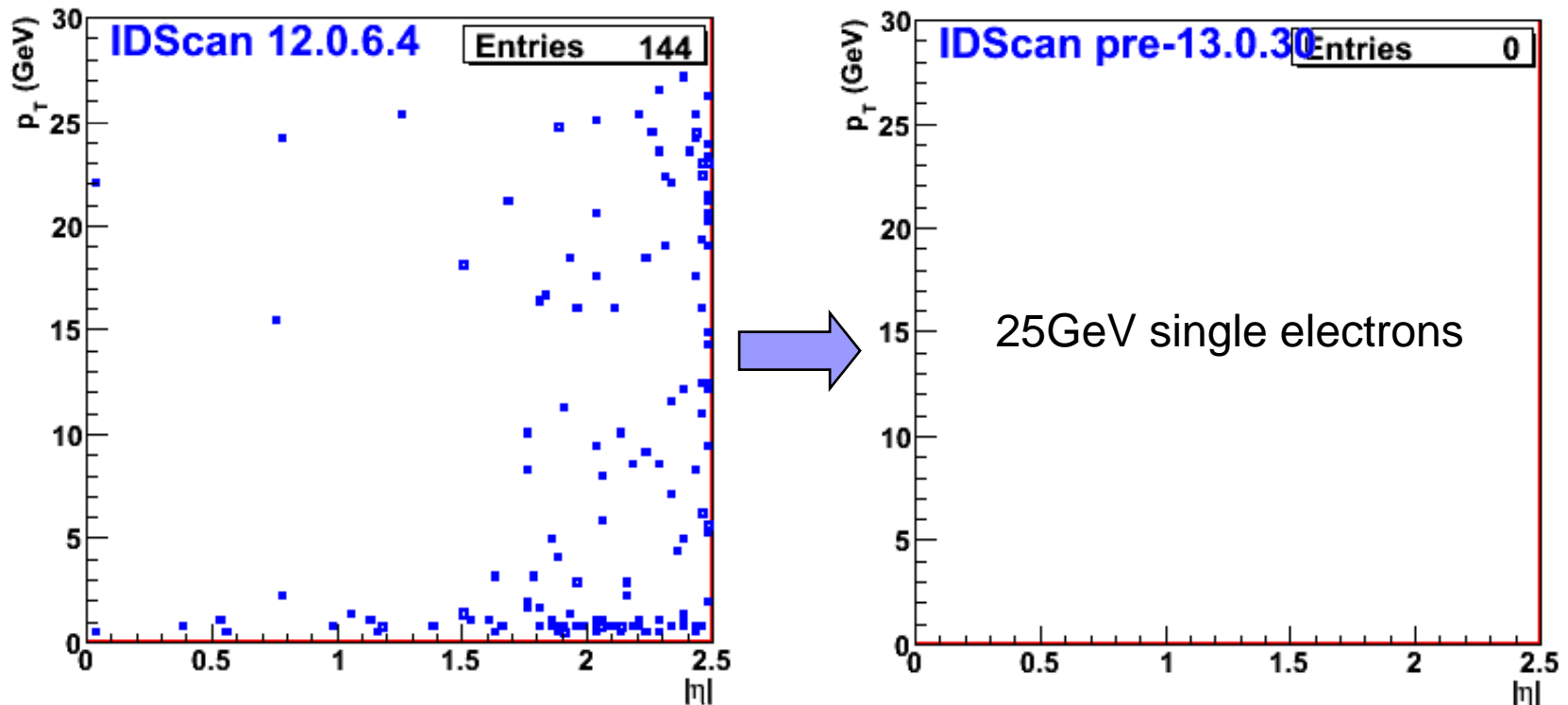
- When two tracks share more than N spacepoints remove the shorter one

■ Now

- Also remove a track if it shares half (or more of its) spacepoints with other tracks



IDScan electron efficiency



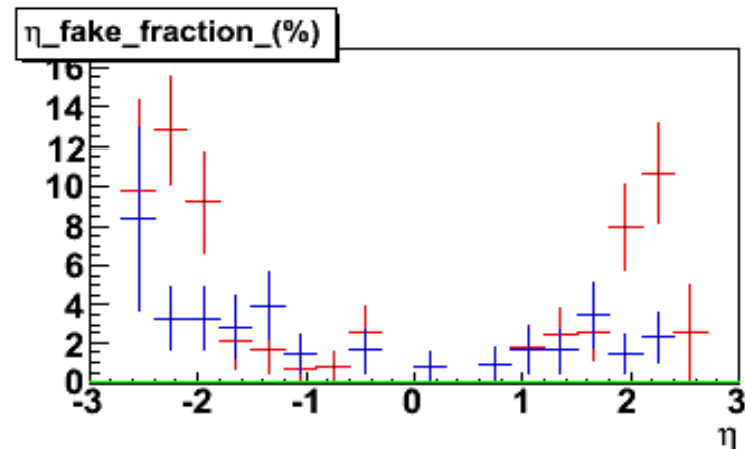
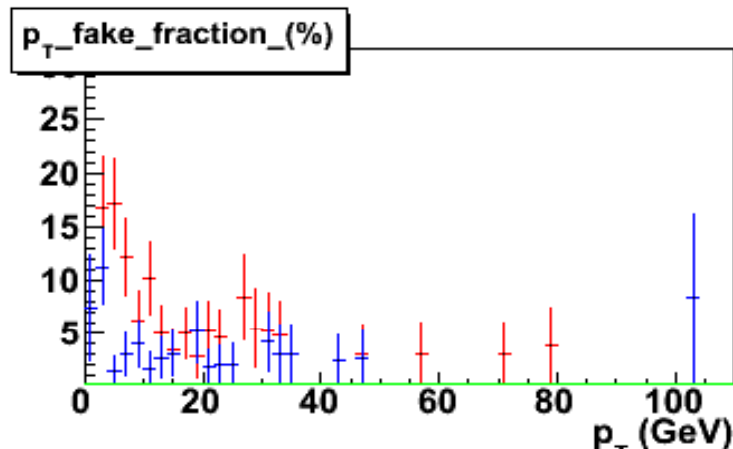
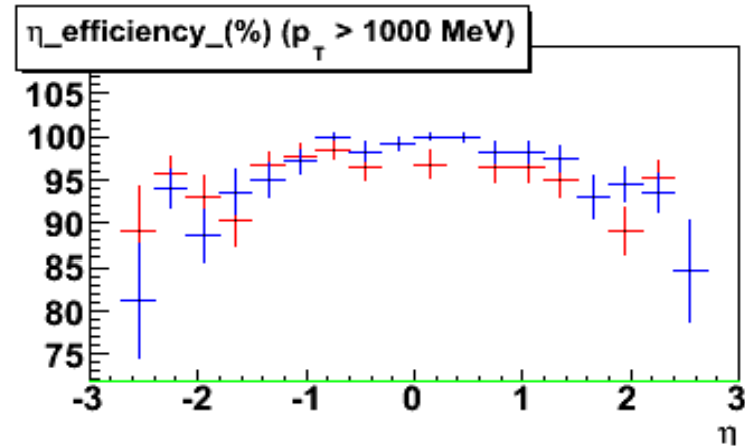
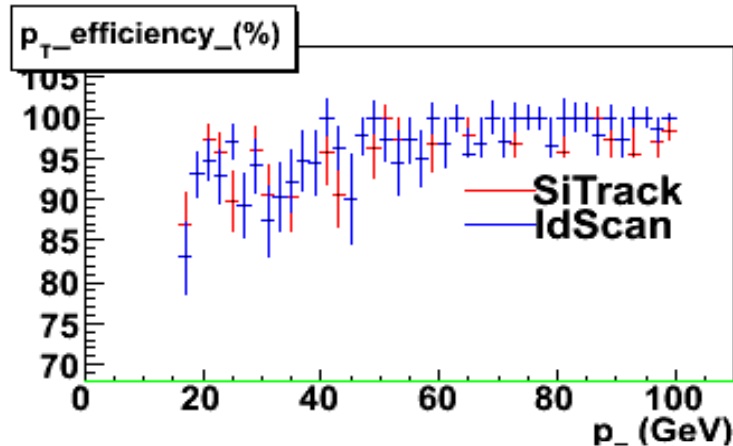
P_T - η scatter plot for tracks reconstructed by the event filter, but lost at L2.

- With the SCT fixes & improvements in fake track removal, a retuning of our cuts increased our efficiency with respect to the event filter from 98.5% to 100%, while halving the fake rate.

Efficiency & Fakes

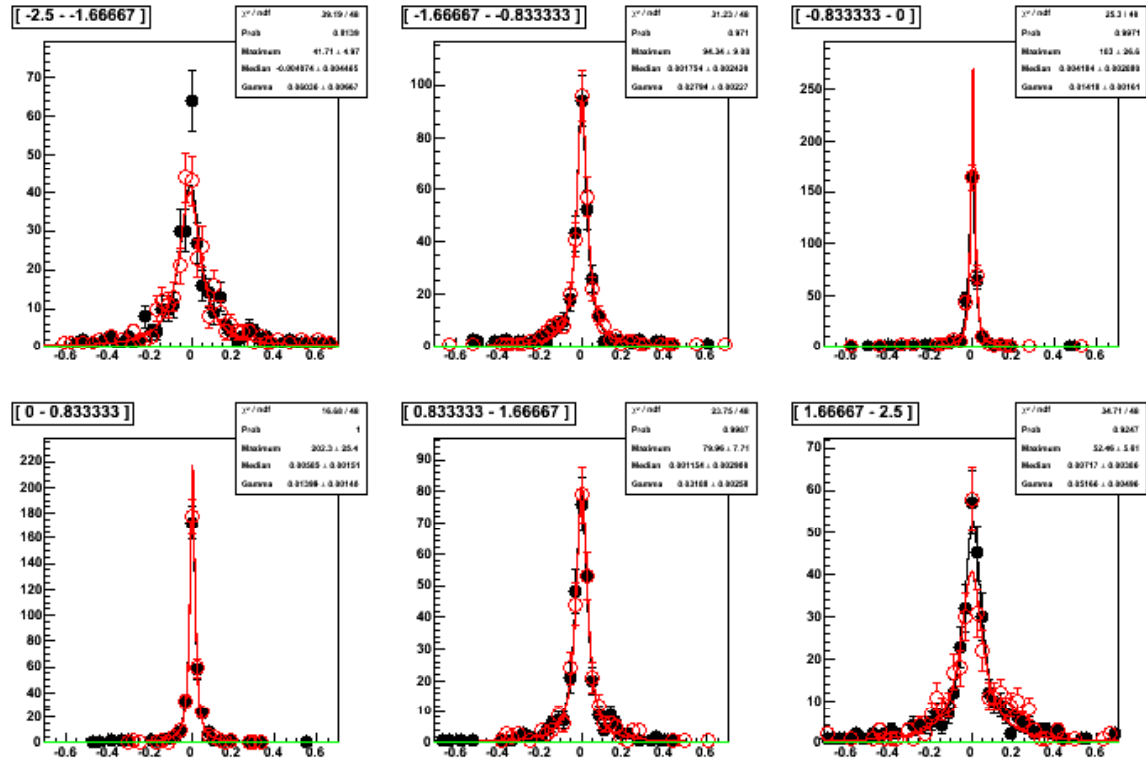
(%)	SiTrack	IdScan
Eff	95.3 ± 2.2	95.8 ± 2.2
Fake	3.9 ± 0.4	1.8 ± 0.4

Single electrons

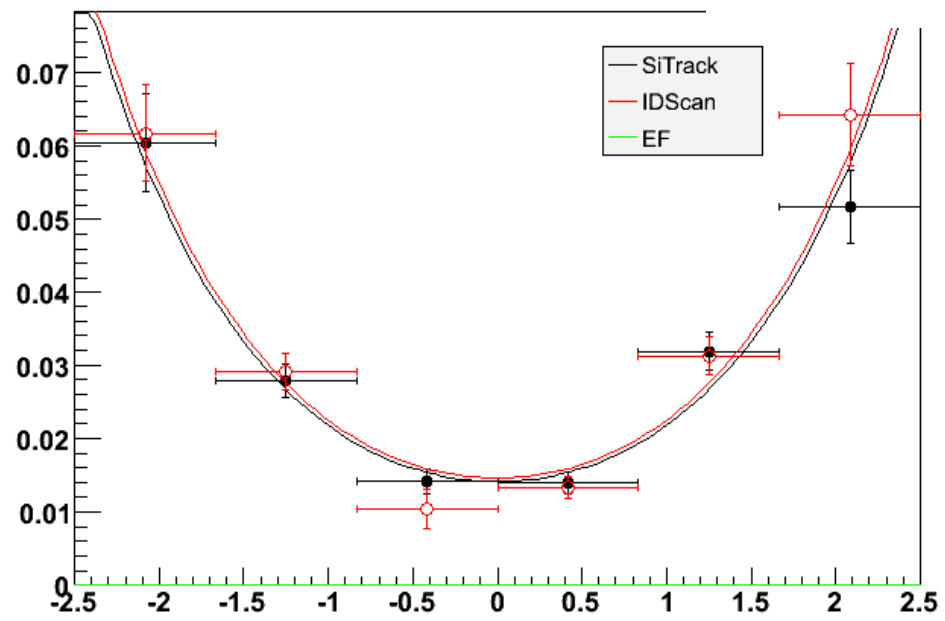


- Efficiency : Loop thru kine tracks, see if at least one reco match found.
- Fake rate : Loop thru reco tracks, see if they are not match to kine.
- Matching : $(\text{total \# hits in reco track}) / 2 < \# \text{ of truth matched hits}$

d_0 resolution vs. η



sigma

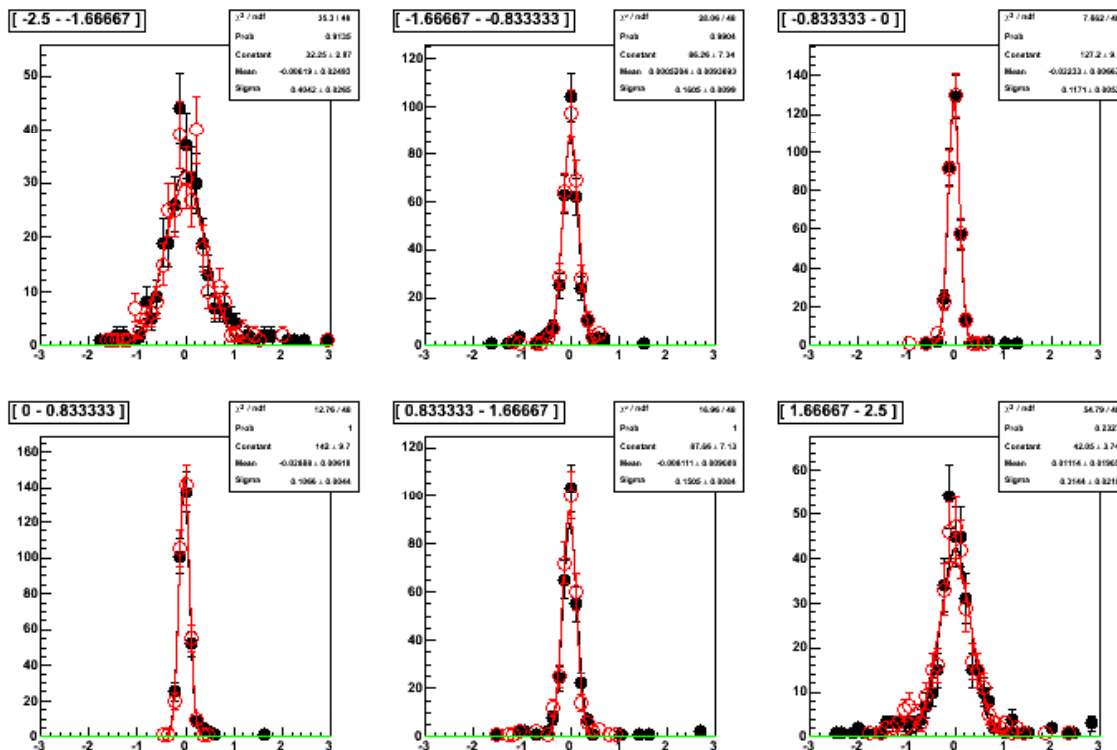


— SiTrack
— IDScan

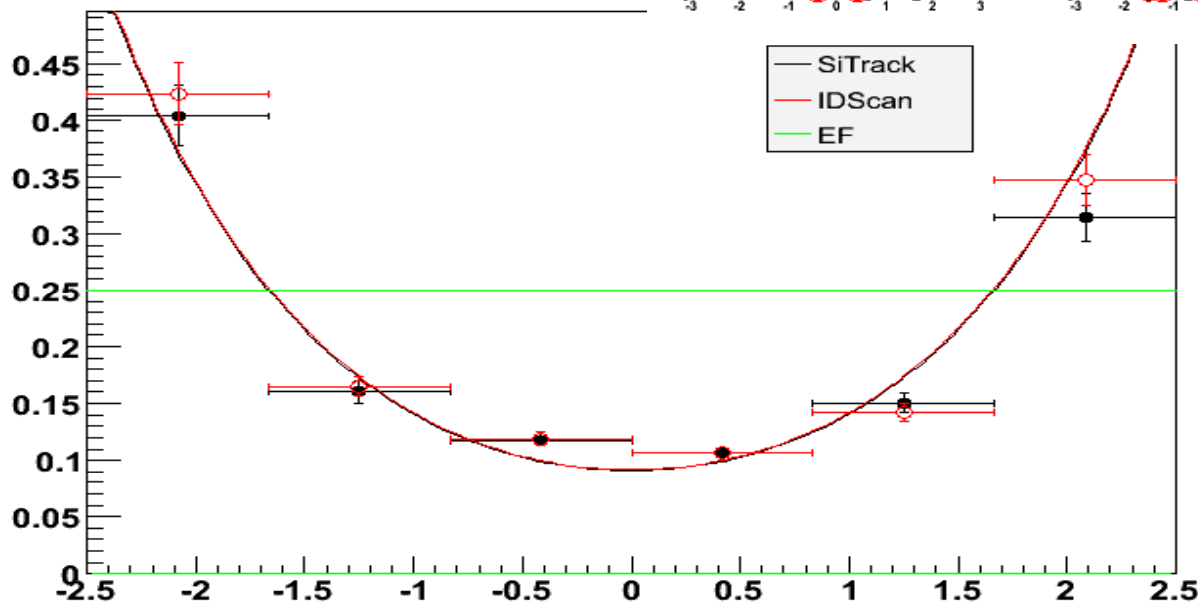
mance



Z_0 resolution vs. η



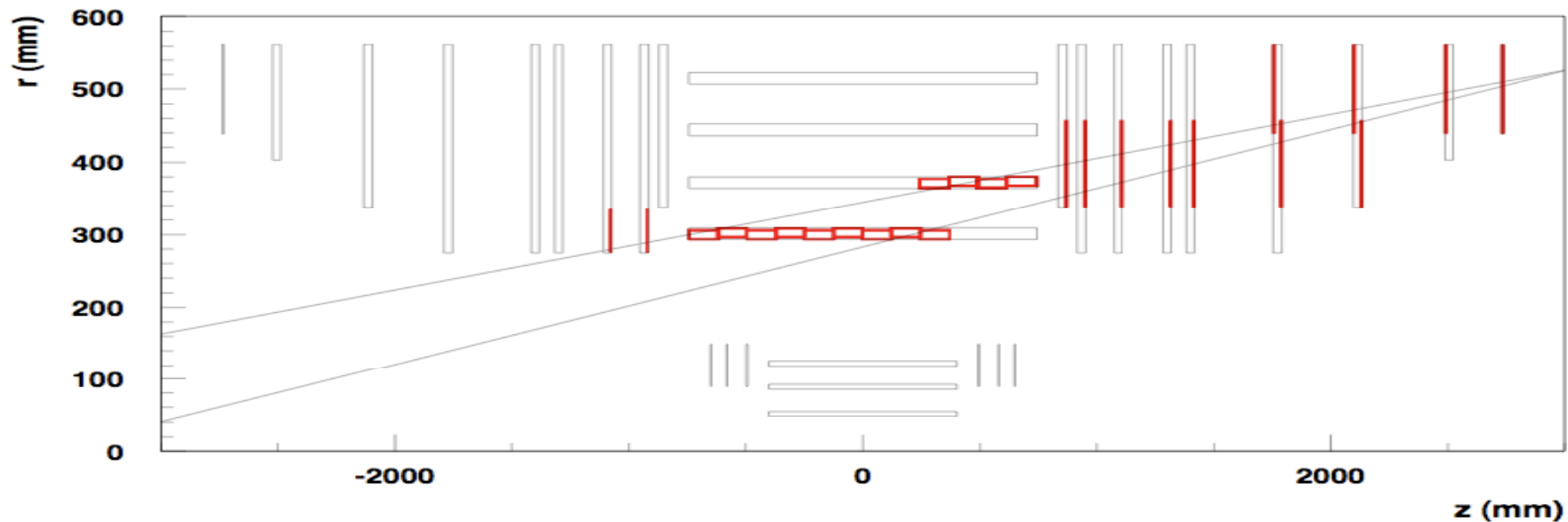
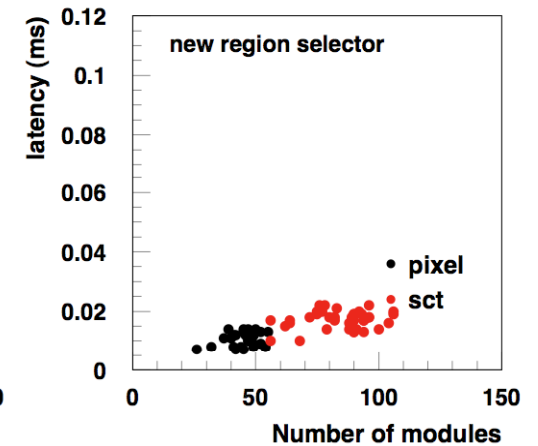
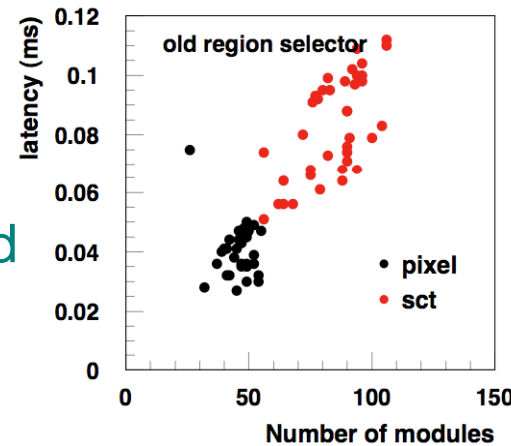
sigma



— SiTrack
— IDScan

Improved Region Selector

- Crucial component for accessing data in an RoI
 - New implementation
 - Allows for more flexible RoI shapes
 - Allows data to be retrieved layer by layer
 - Much faster and tidier



Artemis deliverables

■ WP1.a.1

“Tools for monitoring the performance of track reconstruction in the ATLAS LVL2 Trigger”

(due in month 13)

□ All performance plots integrated into the Trigger/TrigAnalysis/TrigInDetAnalysis package
(done)

□ RTT jobs for regular monitoring of the L2 tracking performance in all Trigger slices (electrons, muons, jets, taus, B-physics)

(done for electrons; in progress for other slices)

Major contribution to the CSC note on HLT tracking

Plans

- Tune the Trigger hypothesis algorithms involving tracking
- Determine trigger rates and their dependence on various cuts of the pattern recognition algos and the hypothesis algos
- Integrate the L2 tracking software components for the Si Trackers in the Milestone runs (starting with SCT in M5)
- Develop/commission the monitoring software for L2 Tracking
- Measure Trigger efficiencies with 1st data
(WP1.a.2 due in month 25; may be affected by LHC schedule)