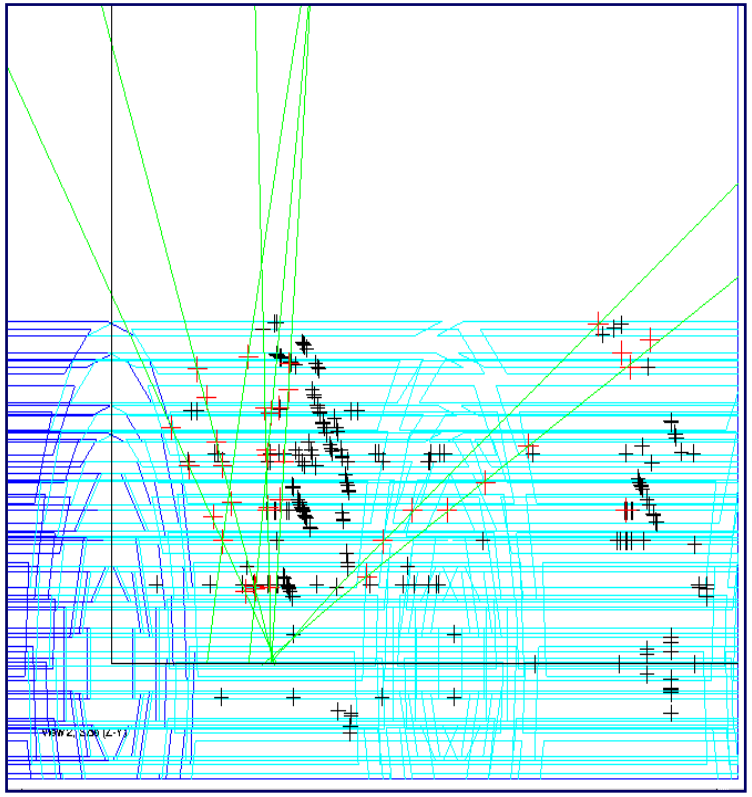
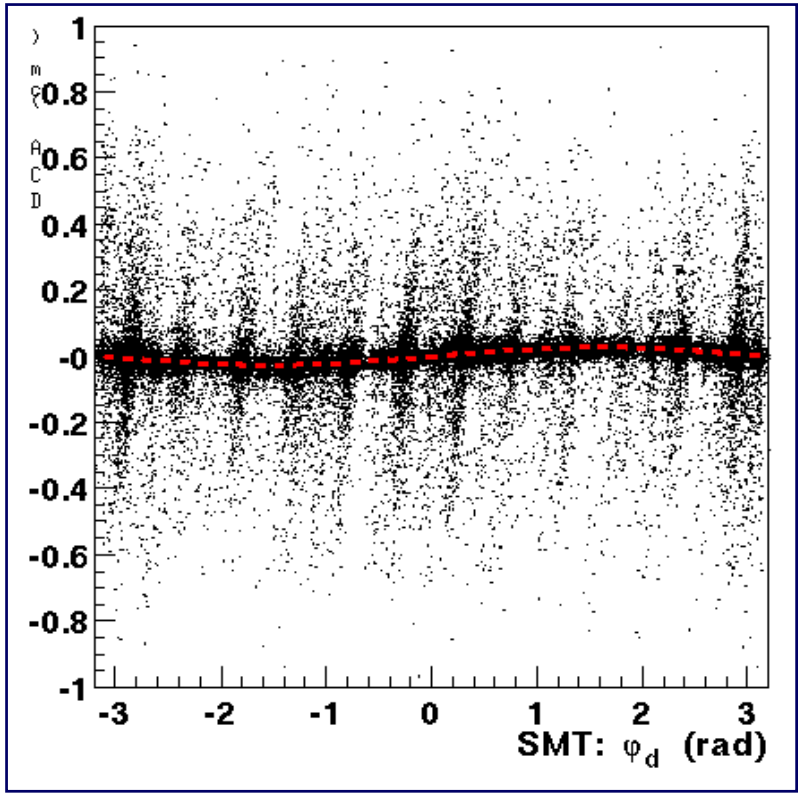
Track Reconstruction

Silicon Microstrip Tracker

Precision vertex reconstruction



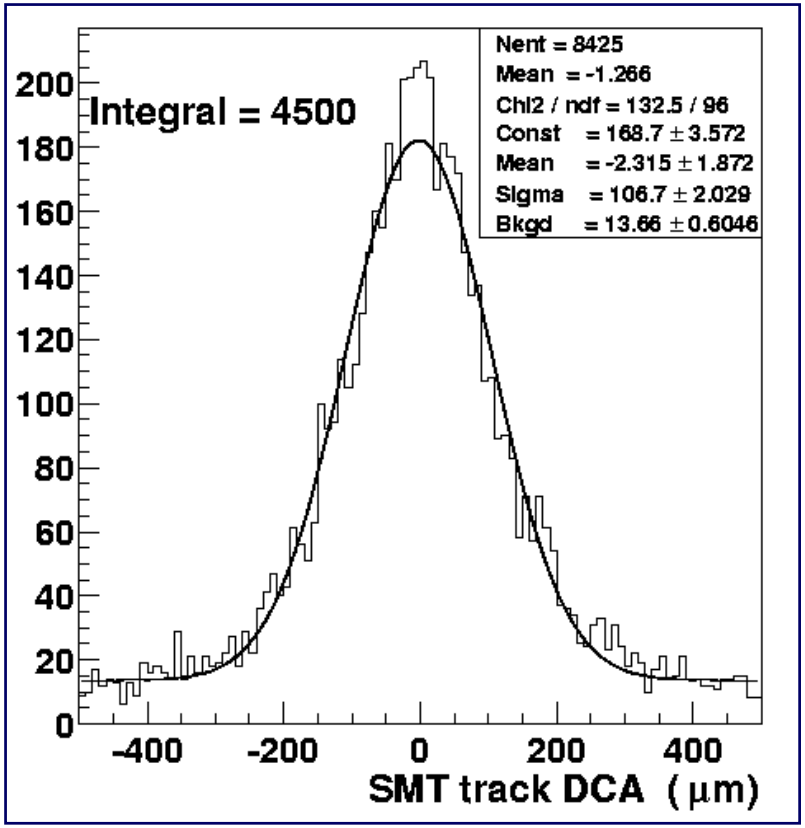
Impact Parameter versus track angle shows beam spot offset



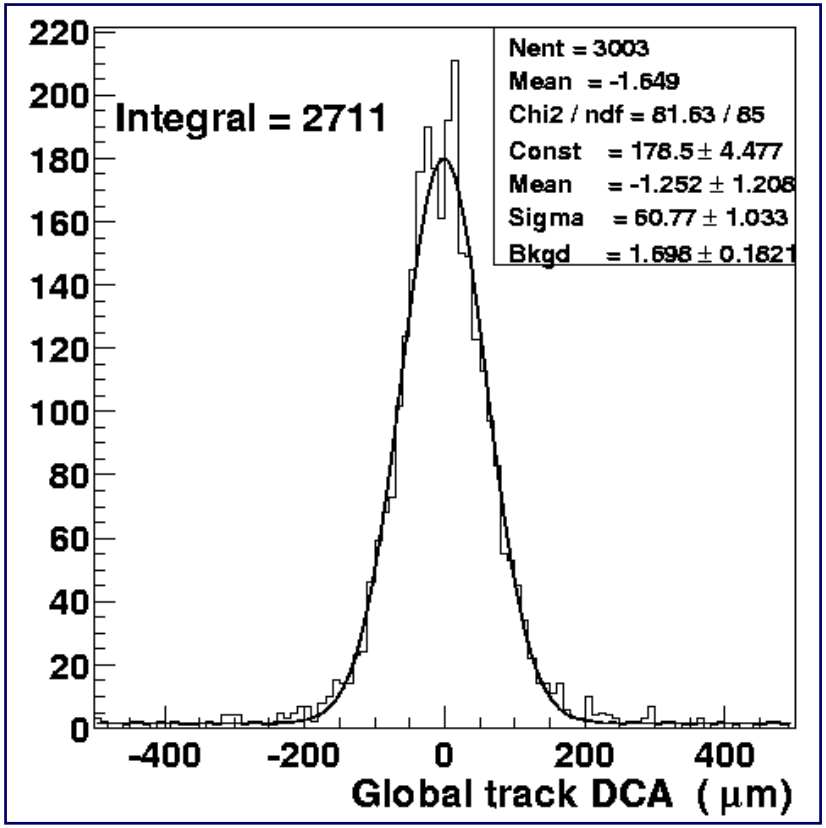
Track Reconstruction

Impact Parameter Resolution

107 μm resolution
with SMT



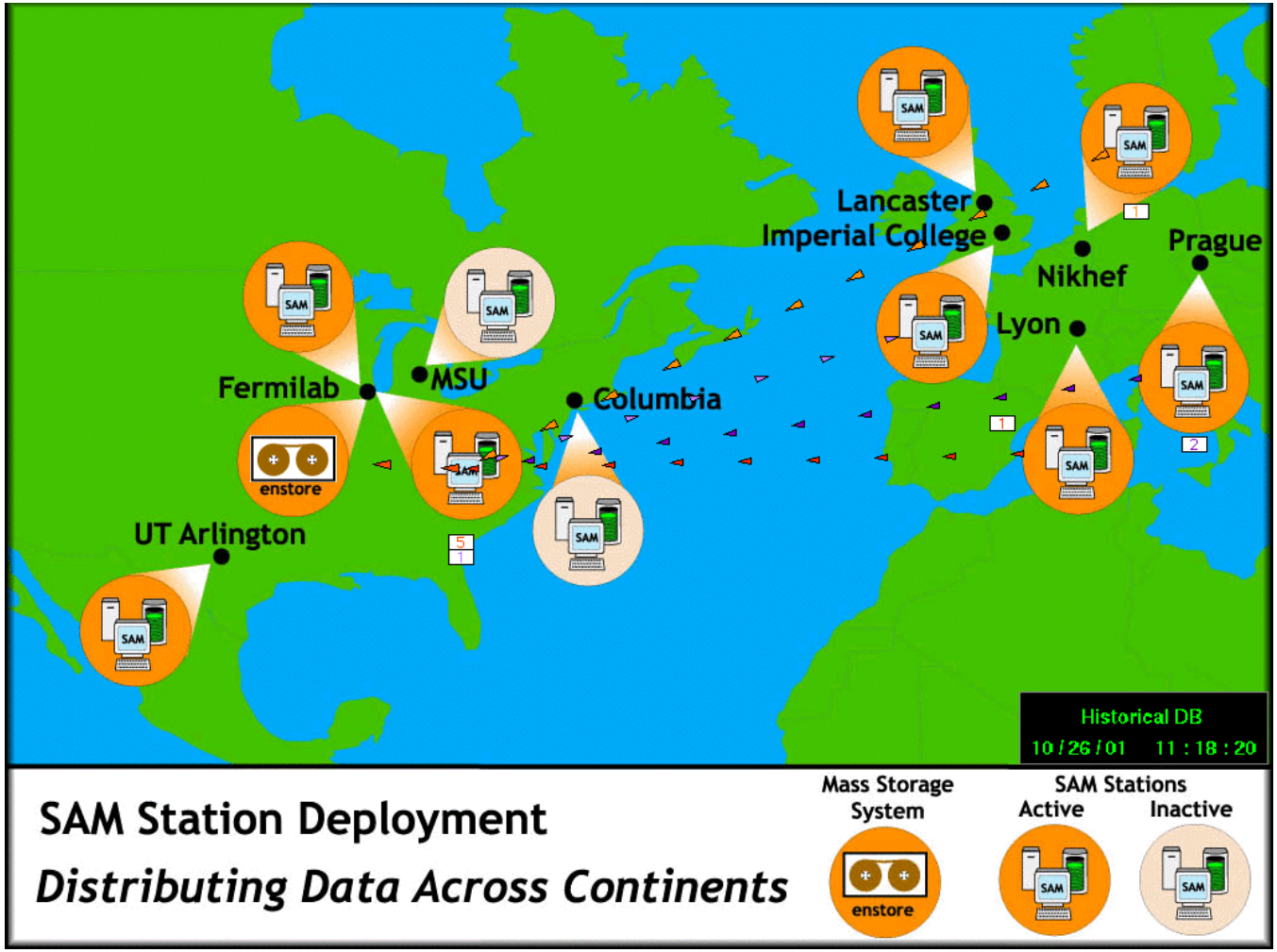
61 μm resolution
with both trackers



Data Access

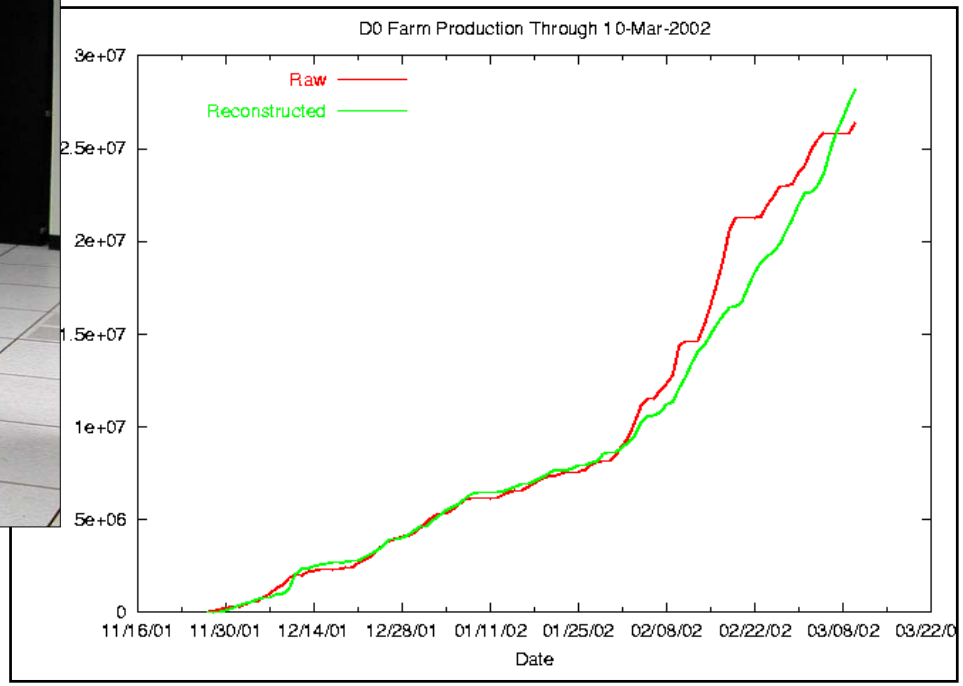
SAM: Sequential Access via Meta-Data

SAM Stations around the world collect and share data for the collaboration



Data Processing

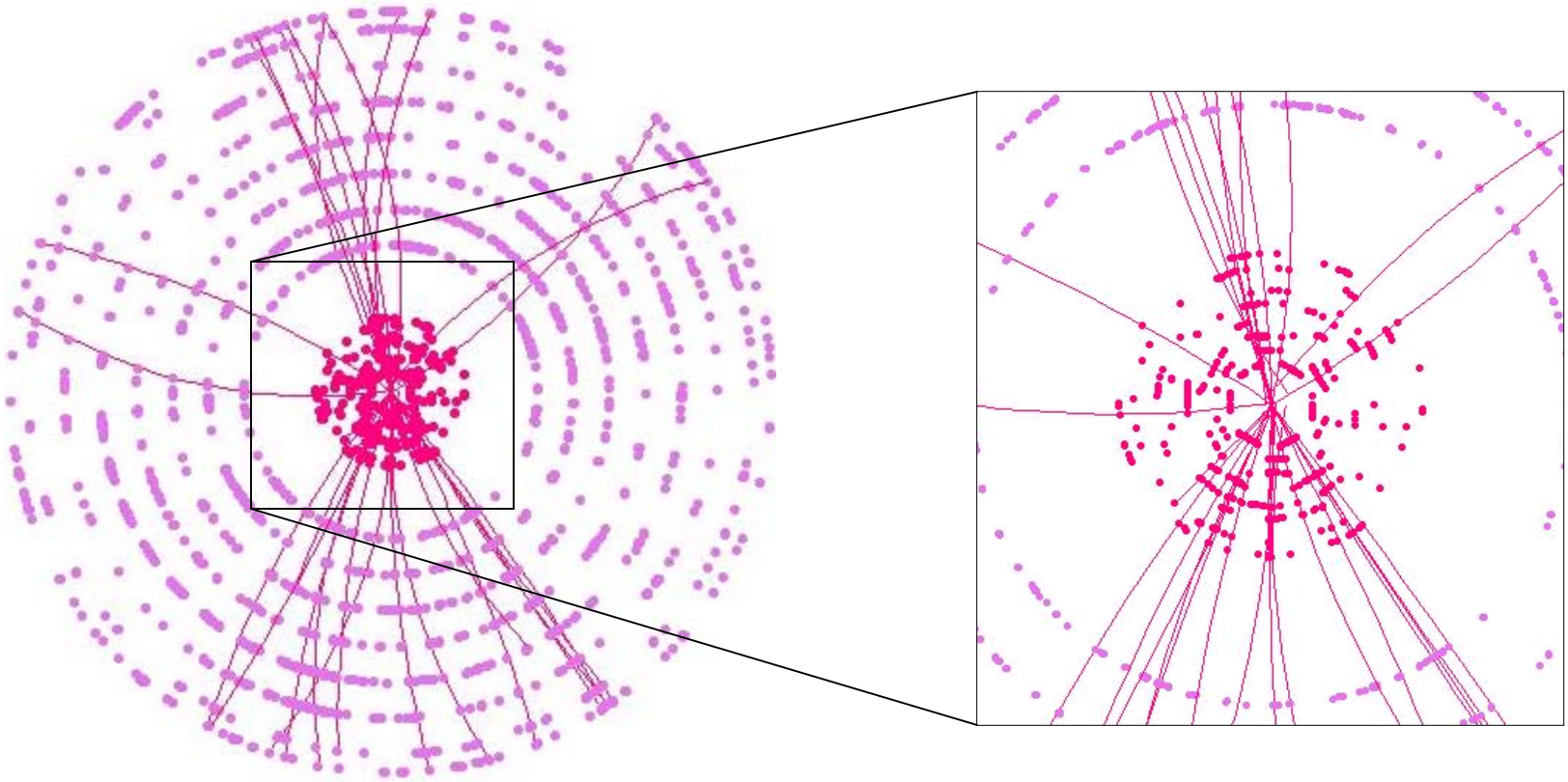
Reconstruction farms



750,000 events/day!

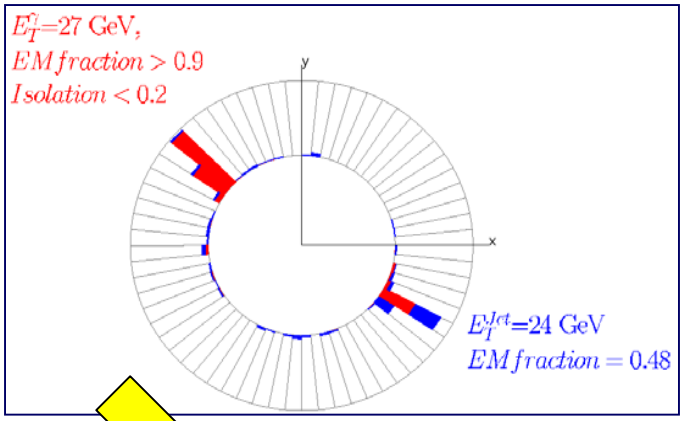
Track Reconstruction

Central Fiber Tracker



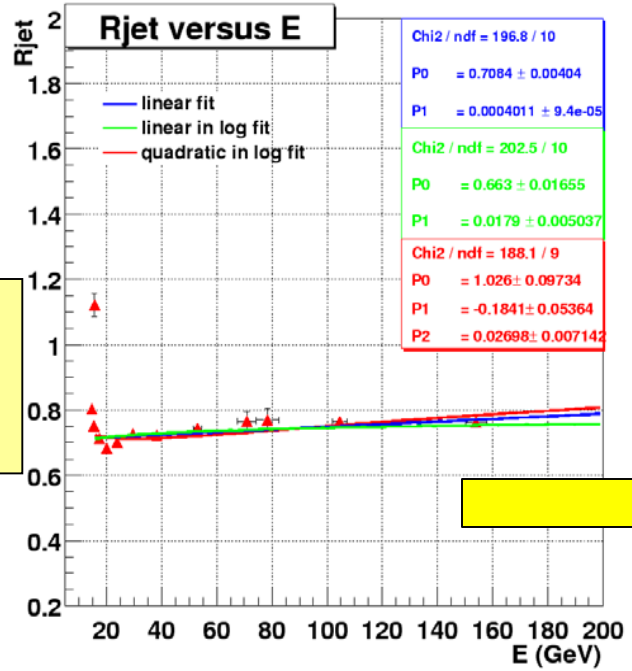
Many tracks, few fakes

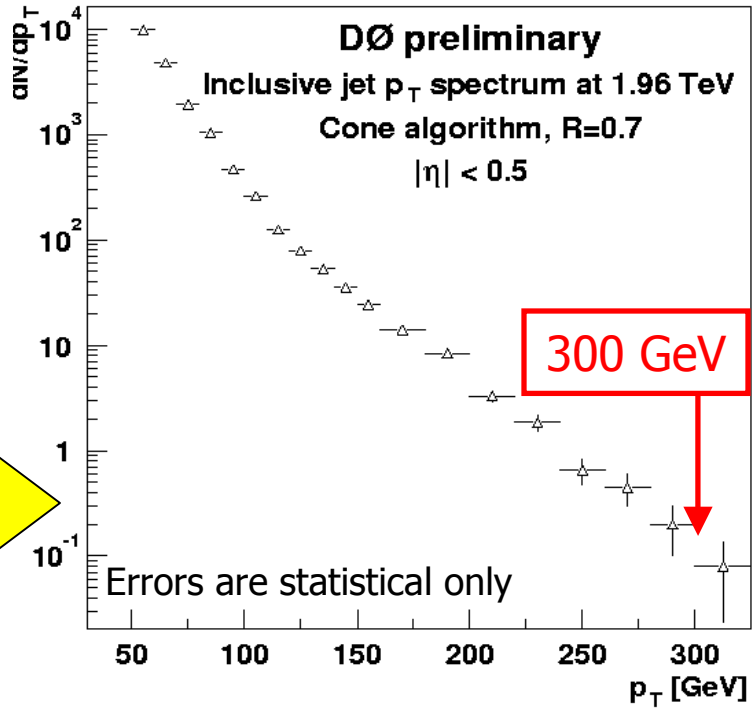
Jet Energy Scale



R= 0.7 "Run 2 cone" algorithm
Preliminary correction for jet energy scale, but no unsmearing of resolution effects

γ + jet events are used to derive the jet energy scale

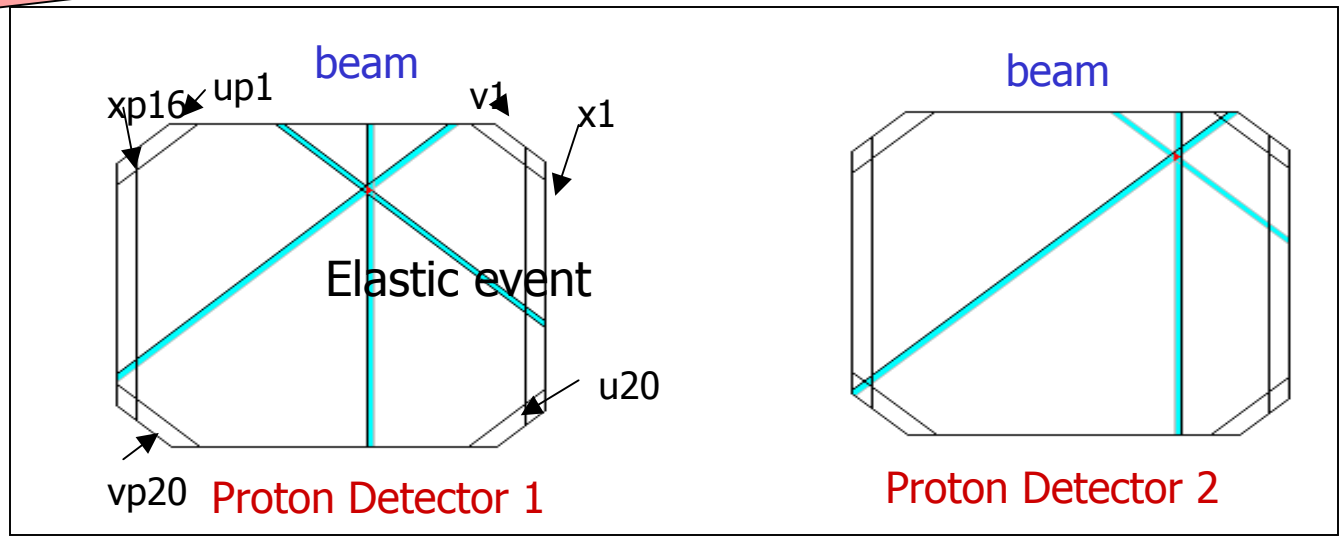


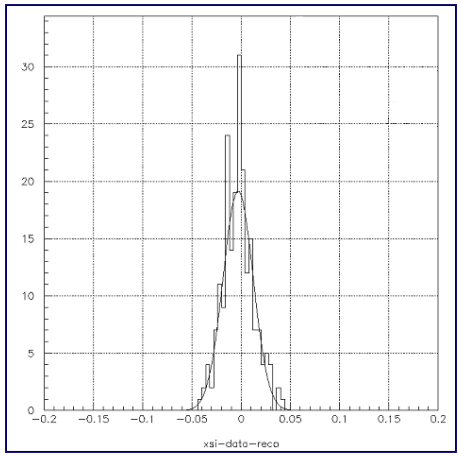


Forward Events

Proton Reconstruction

Scintillating fiber detectors in Roman pots near beam used to tag protons and anti-protons





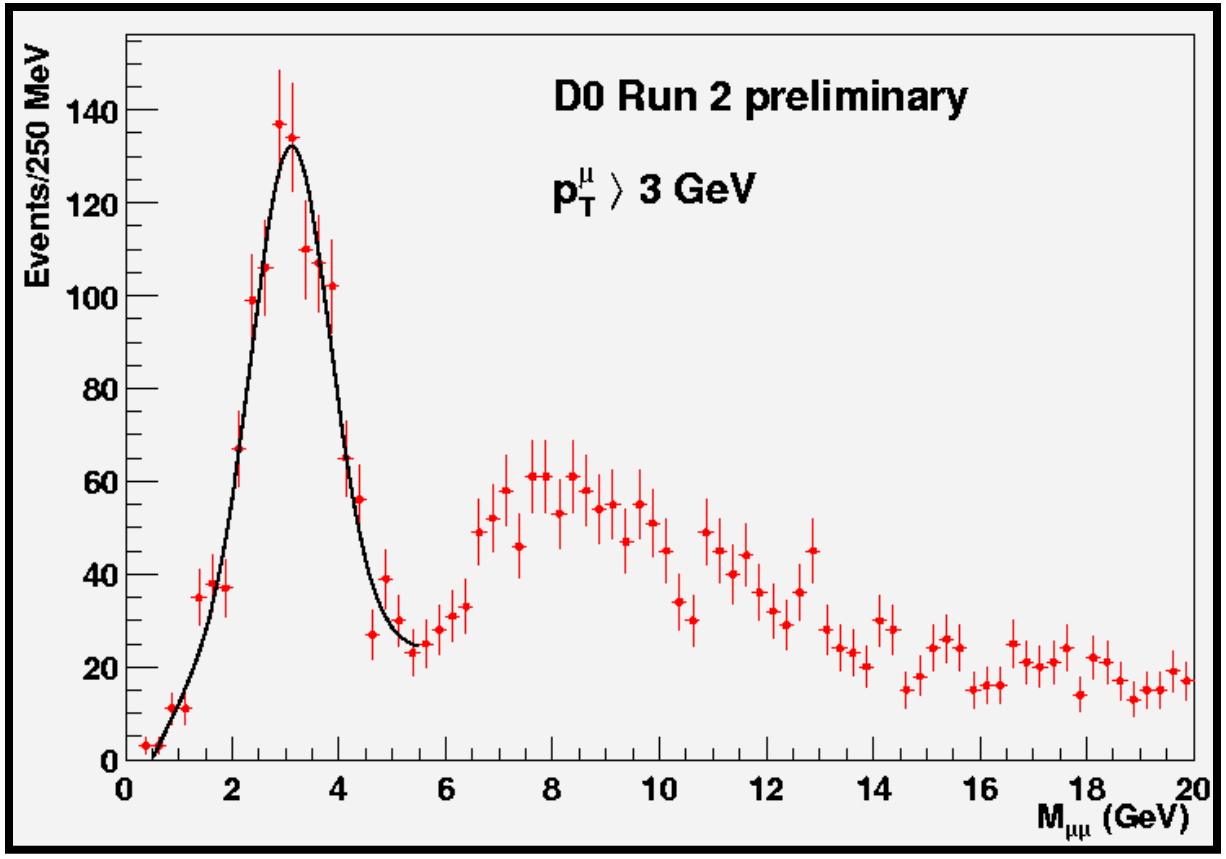
$\xi(= \Delta p/p)$ distribution for a sample of clean elastic events

Commissioning in progress, integration with central detector in summer

Muon Reconstruction

J/Ψ

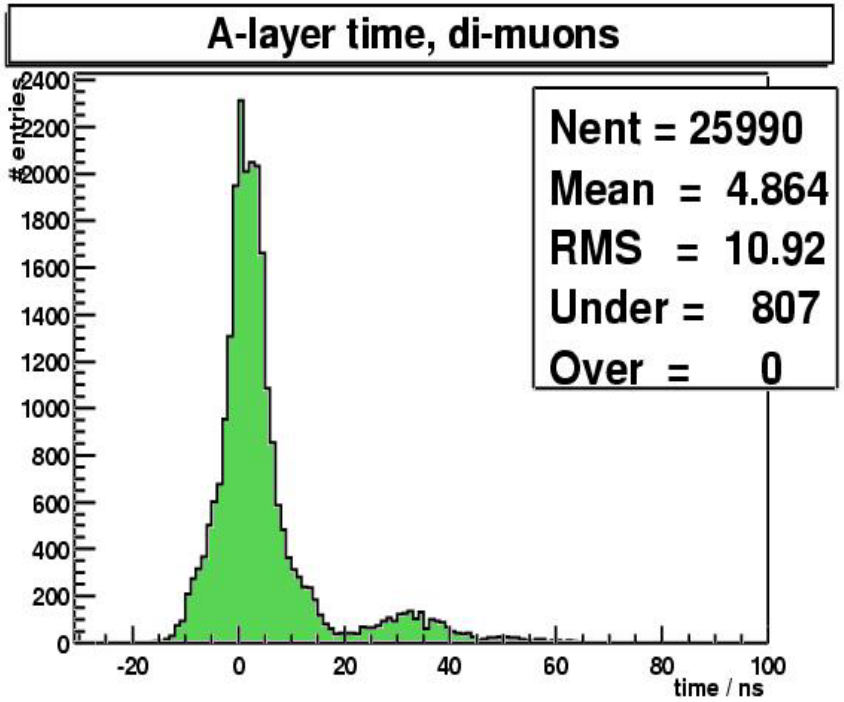
Invariant mass formed with pairs of opposite signed muons, using only muon system information

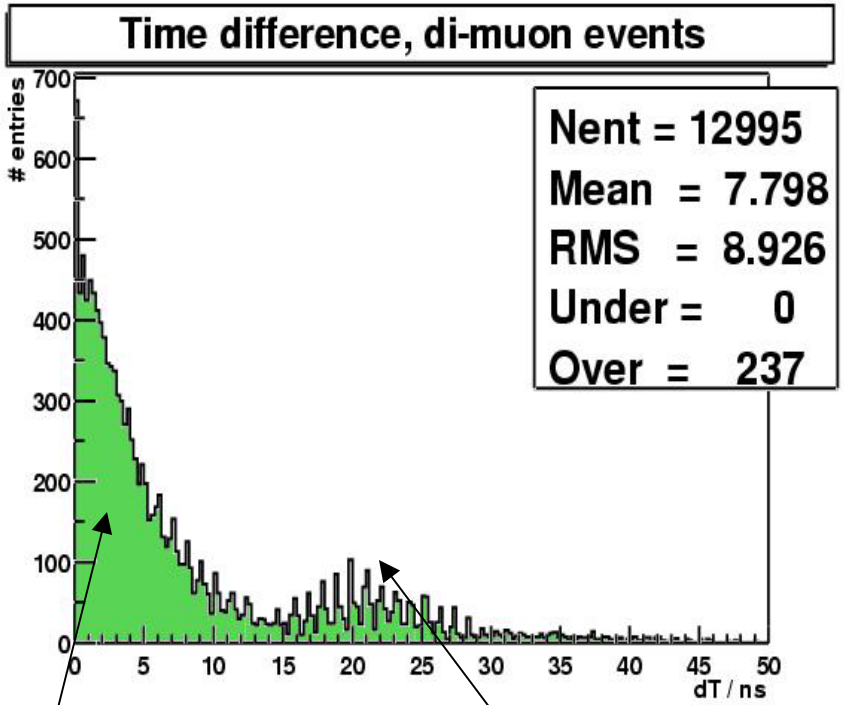


Muon Reconstruction

Cosmic Rejection

Scintillator timing helps reject cosmic rays





Real μ

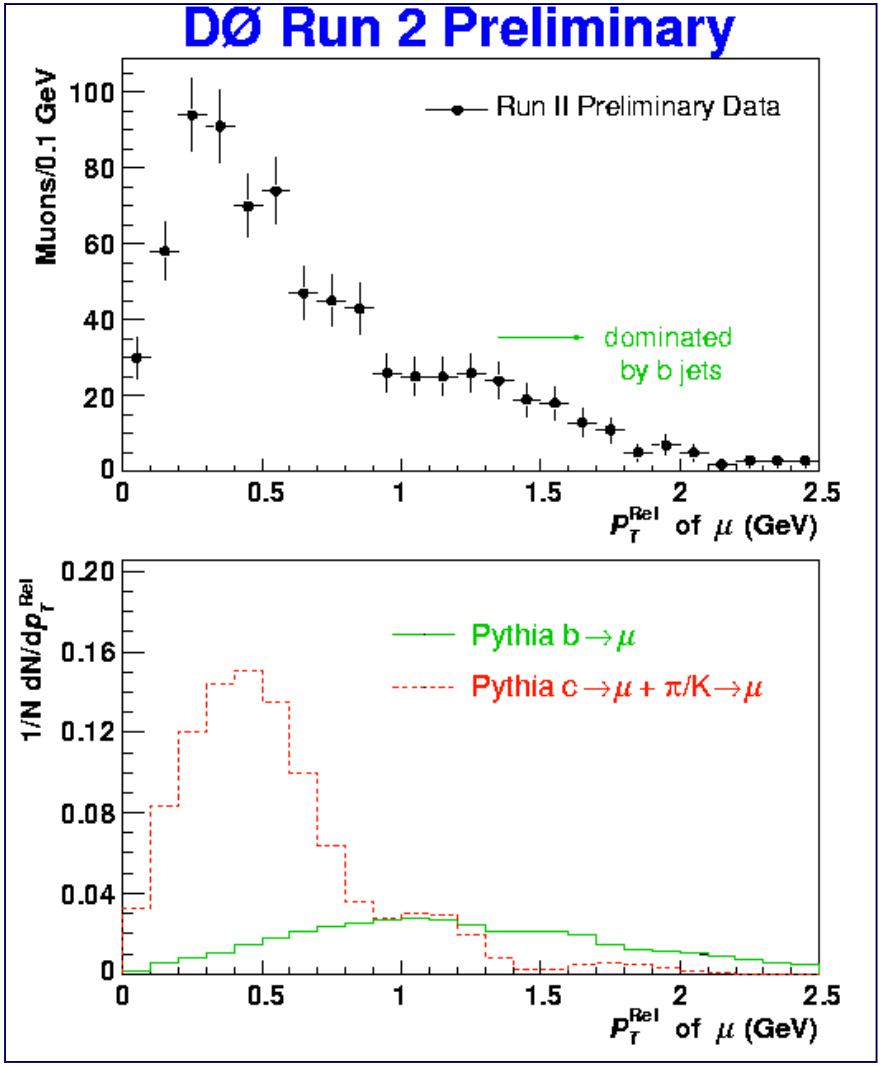
Cosmic rays

Muon Reconstruction

Muons in Jets

Relative momentum of μ's inside jets

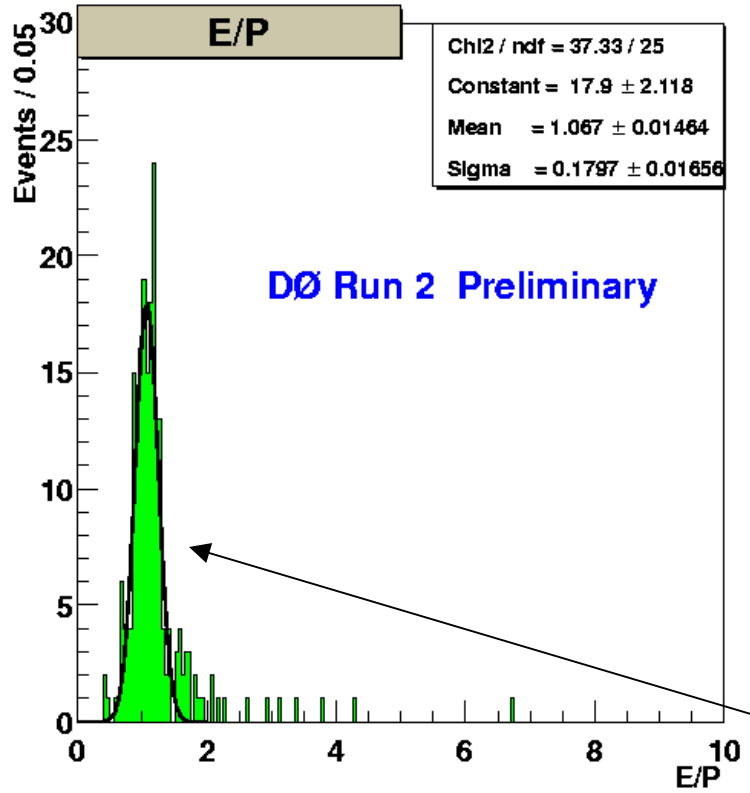
Monte Carlo predicted distribution

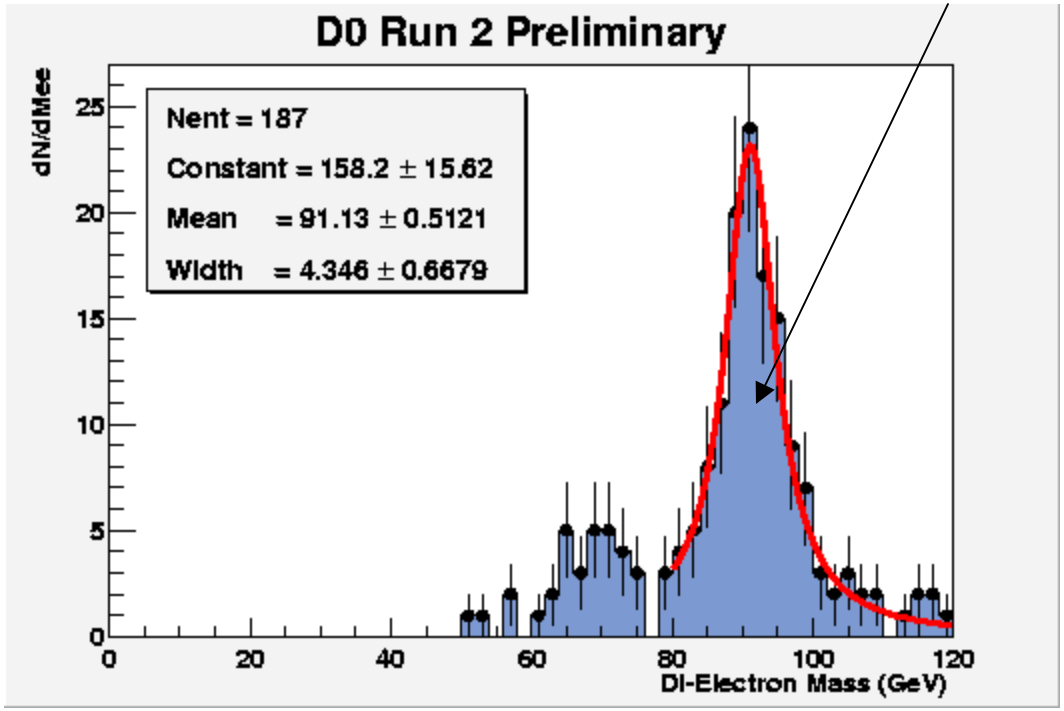


Electron Identification

Calibration

Calorimeter calibration via the Z^0 mass



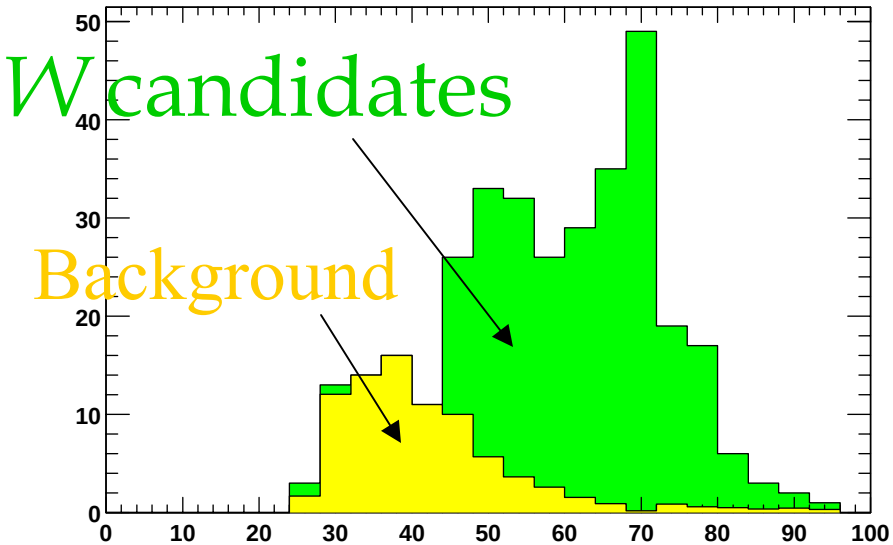


Agreement from the central tracker

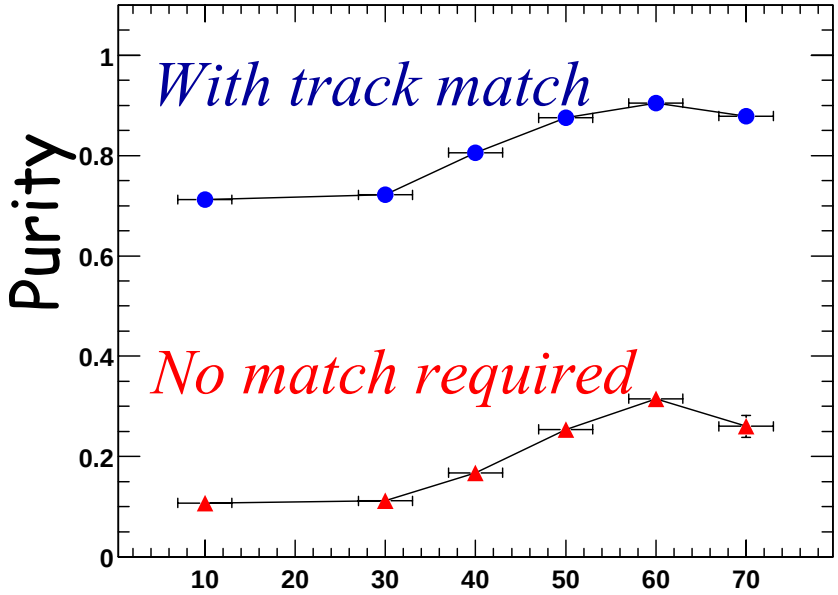
Electron Identification

Track matching

Track reconstruction improves purity



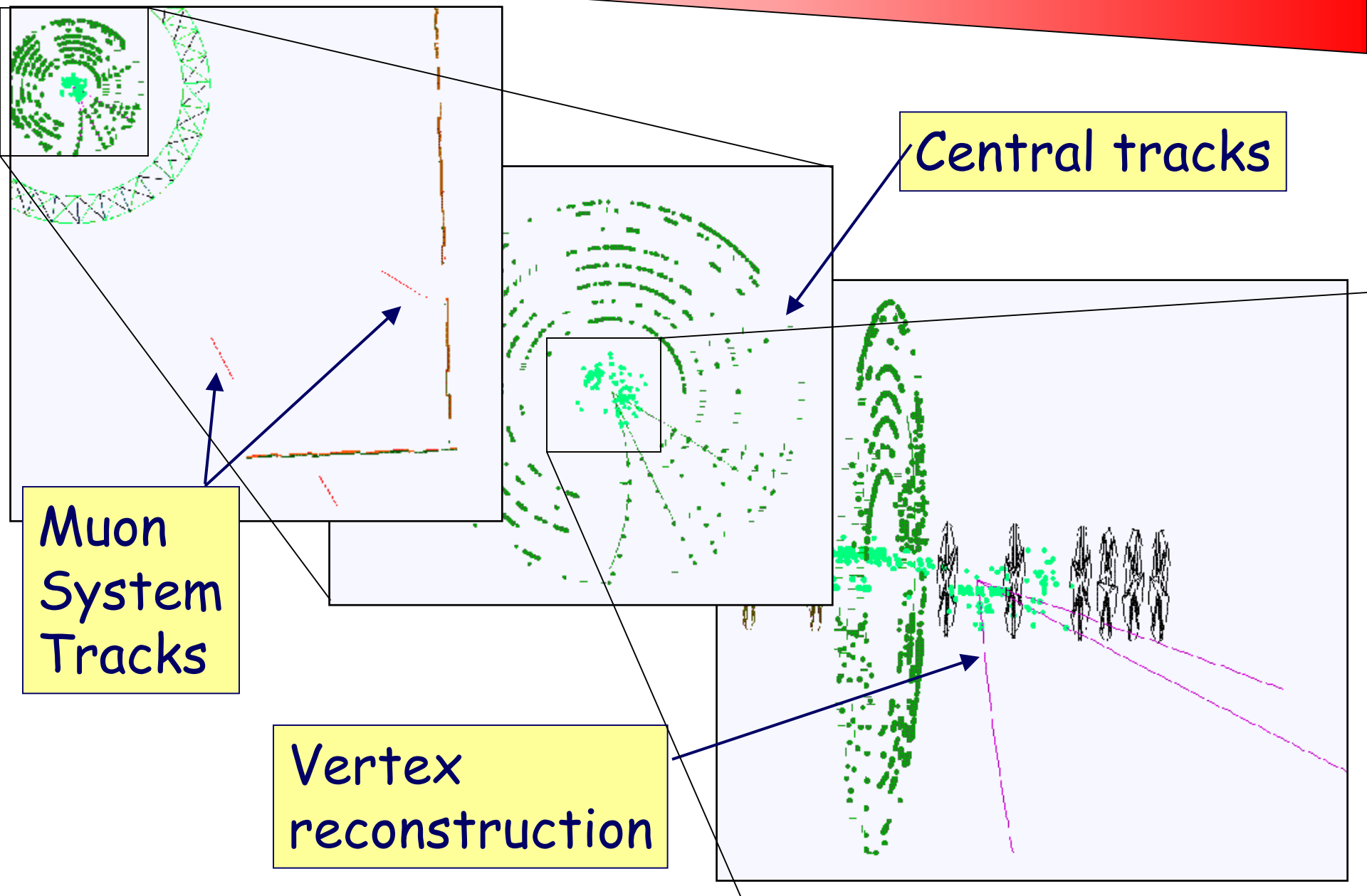
$e\nu$ transverse mass



$e\nu$ transverse mass

200 Signal events at 95% purity

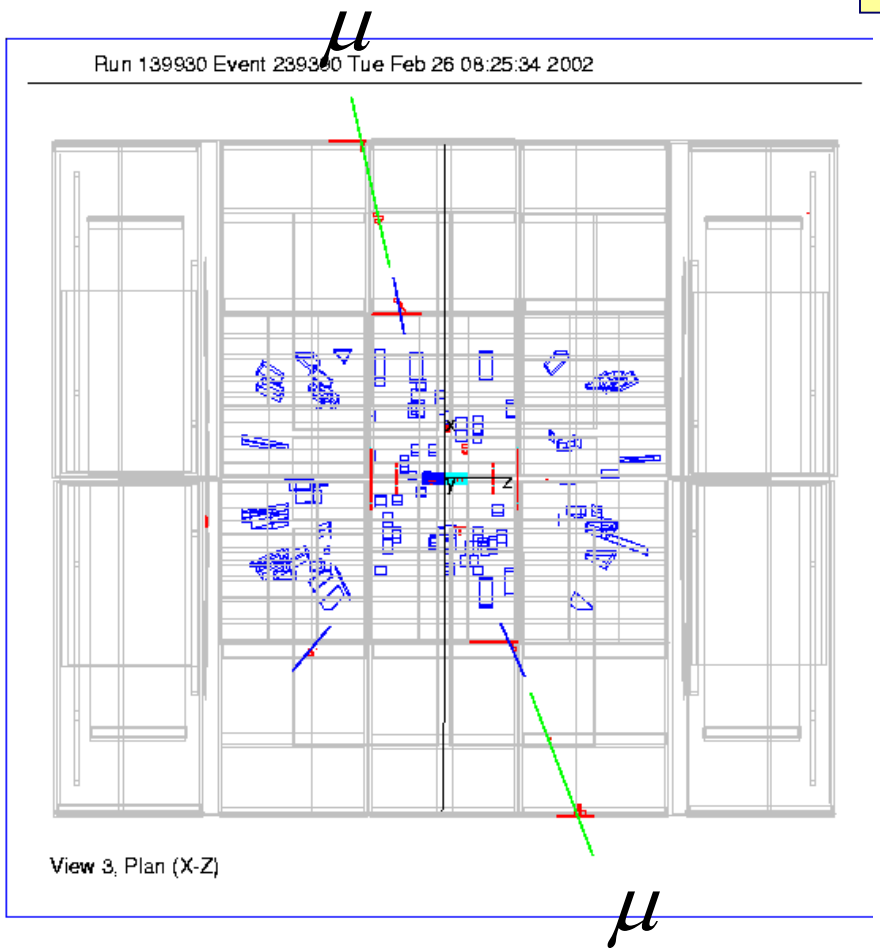
Track Reconstruction

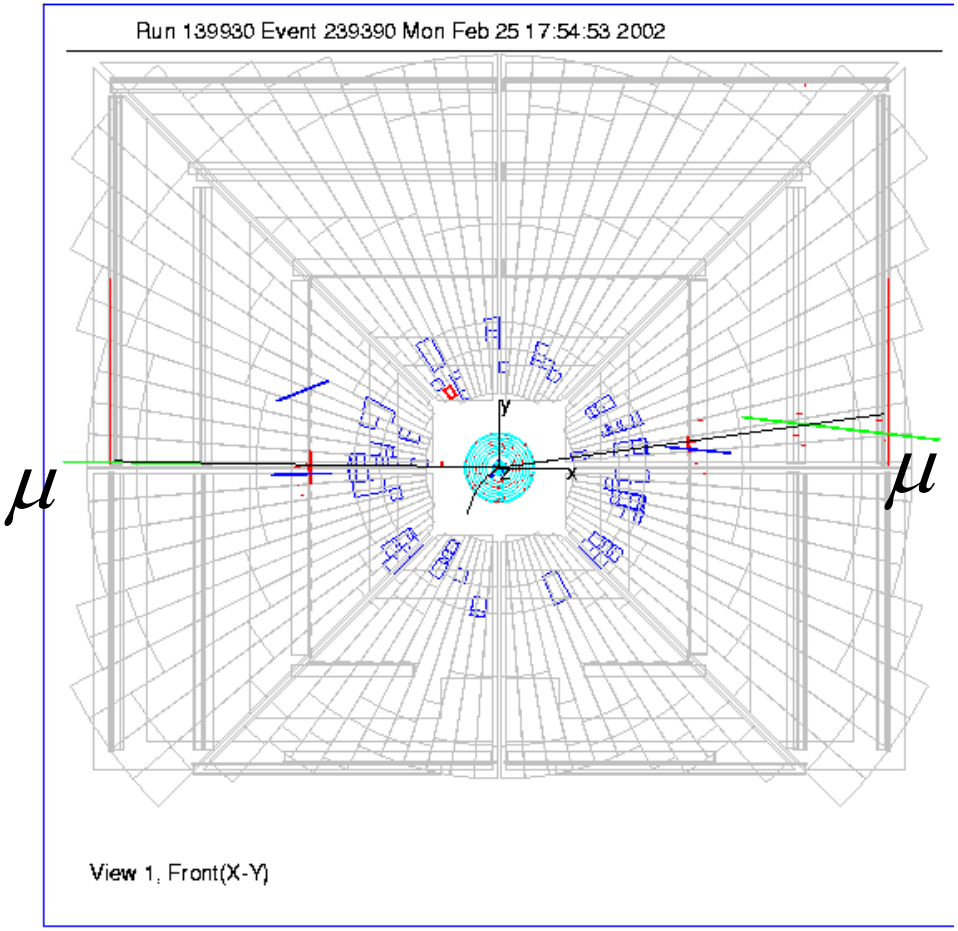


Event Reconstruction

$Z \to \mu\mu$ candidate

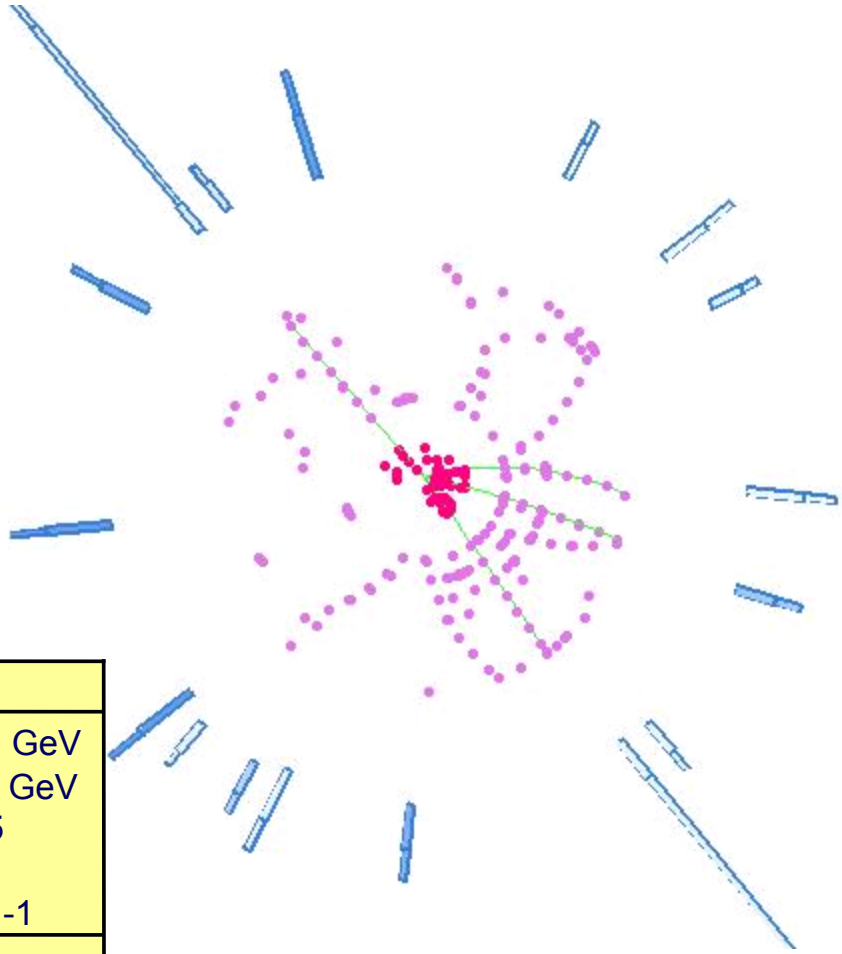
Back to back $\mu^+\mu^-$

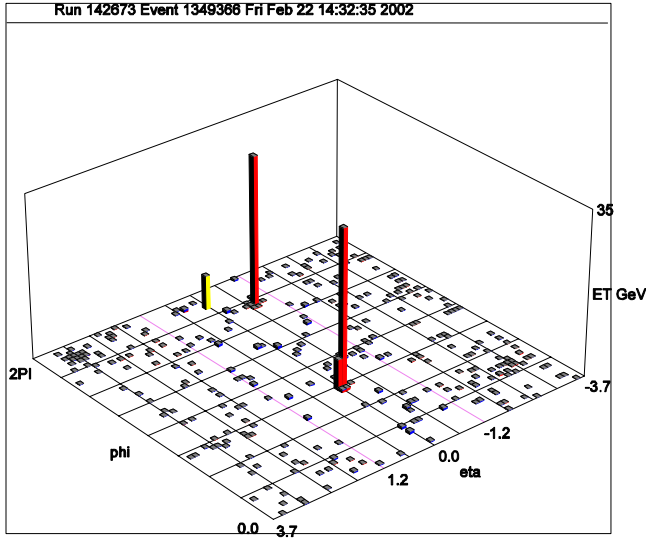


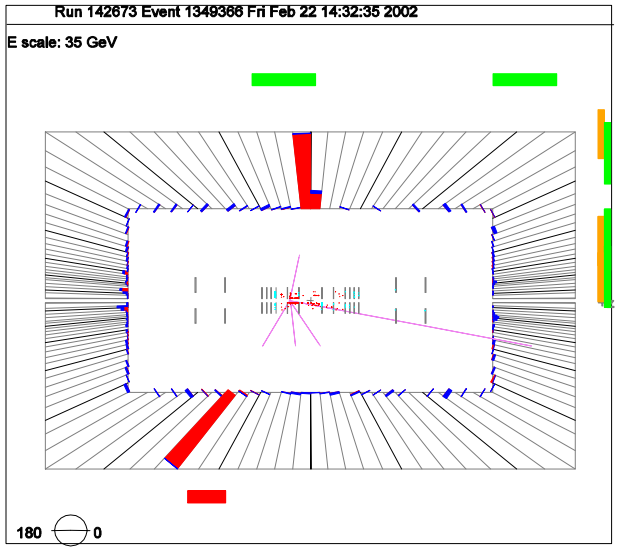


Event Reconstruction

Z->ee candidate







e1	e2
E_T = 44.5 GeV	E_T = 42.1 GeV
p_T = 24.1 GeV	p_T = 32.1 GeV
η = -0.01	η = -0.75
φ = 2.28	φ = 5.34
Charge = +1	Charge = -1
M_{ee} = 93.2 GeV	