Soft muon tag

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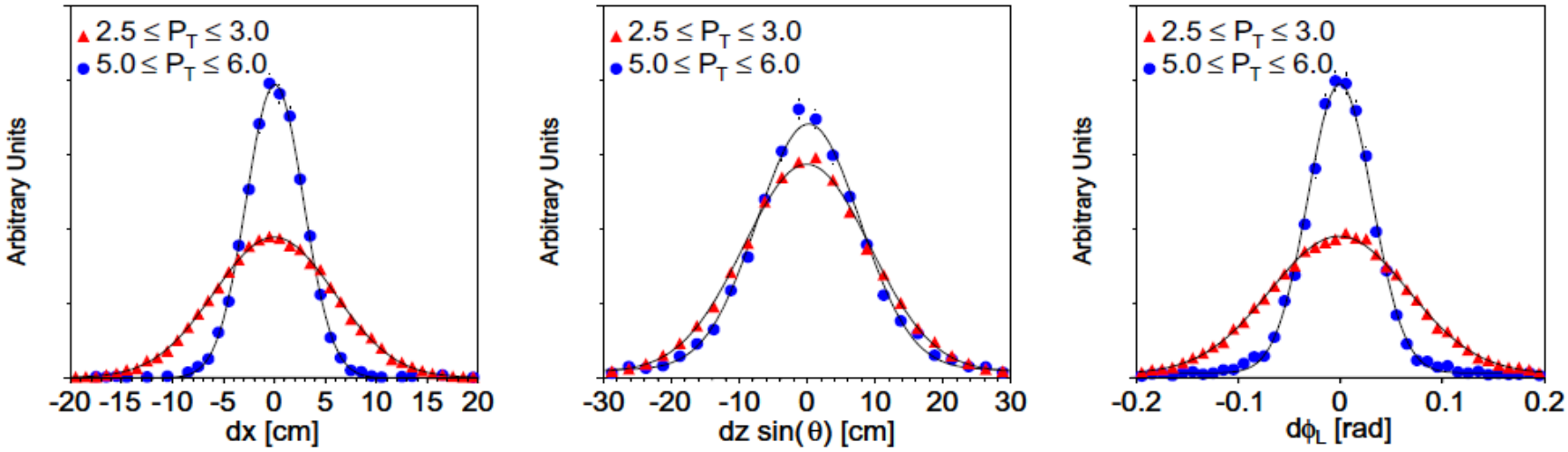
- Soft muon tag :
  - Searching inside jets for b hadrons into muons.
  - The track segments in the muon chambers match to the extrapolated tracks in the central tracking system.
  - Based on a χ^2 function that uses the variables information:

x: the extrapolated position along the muon chamber drift direction
z: the longitudinal coordinate along the chamber wires
Φ_L : the extrapolated slope

The difference between the extrapolated and measured positions in x and z are Δx and Δz , the extrapolated and measured slope as $\Delta \Phi_L$

The distribution of these variables over an ensemble of events are the "matching distributions"



The expected mean and width of the distribution are μ_i and σ_i

The Q, a sum of the χ^2 variables

$$Q = \sum_{i=1}^{n} \frac{(X_i - \mu_i)^2}{\sigma_i^2}$$

The L , global χ^2 quantity

$$L = \frac{(Q - n)}{\sqrt{\mathrm{var}(Q)}}$$

var(Q) is calculated using the full covariance matrix for the selected variables .

The jet is tagged if a candidate muon with $|L| \leq 3.5$ is found within the $\Delta R < 0.6$ centered on the jet axis

- Tracks in COT are paired with stubs based on the best match in x<50cm.

- Begin by selecting “taggable” tracks.
- At least 3 axial and 2 stereo COT superlayers that have at least 5 hits each.
- The impact parameter d0 of the track with respect to the beamline, less than 2mm
- Originate within 60cm of the center of the detector along the beam direction.
- Track pt above an approximate range out threshold of 3 GeV/c
- Fiducial volume at the muon chambers that extends 3σ outside of the physical edges of the chambers, sigma is the deviation expected from the multiple Coulomb scattering at the track Pt

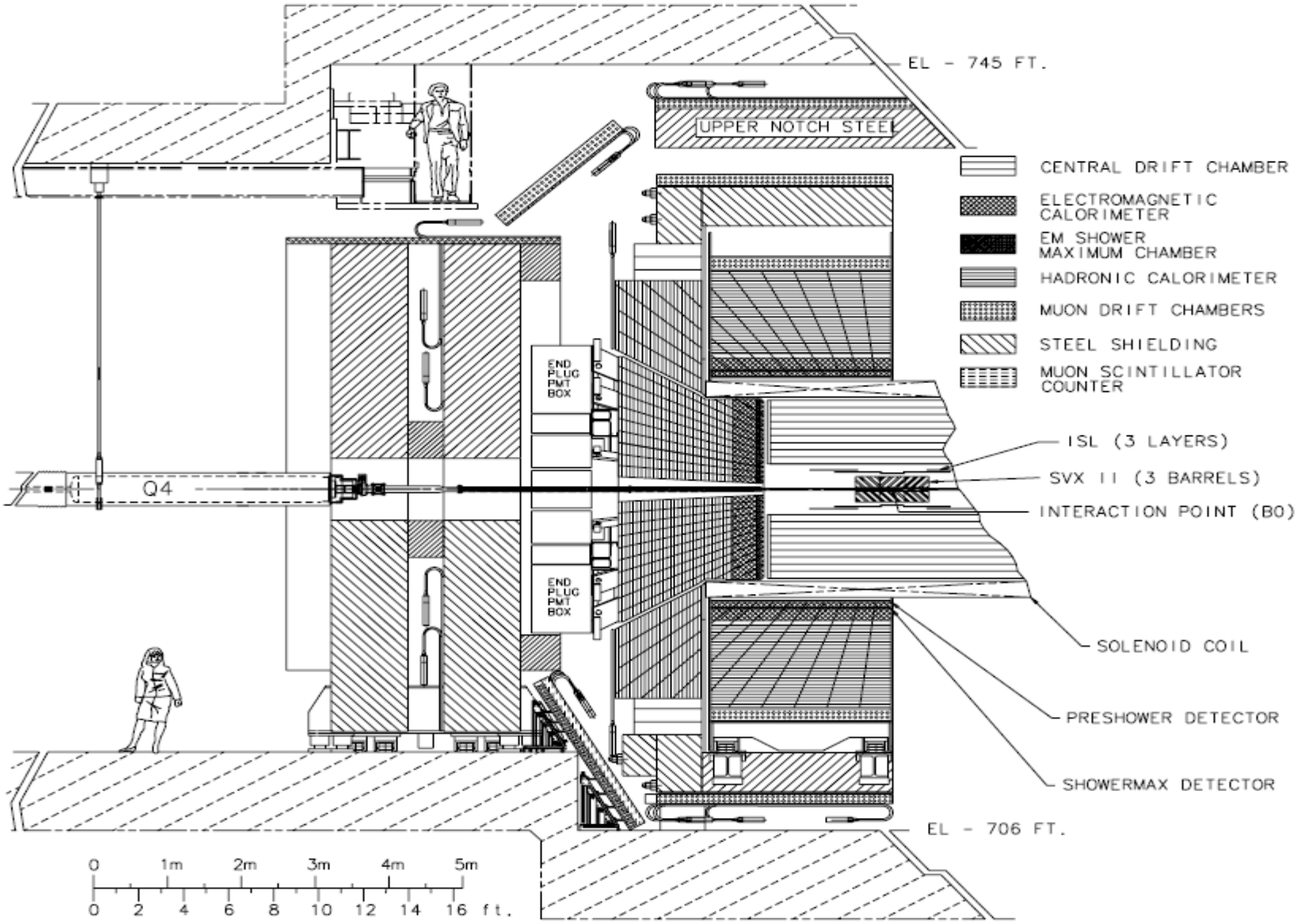


FIG. 1. Elevation view of the CDF II detector.