

# TimeSPOT WP4: Stato delle attività a Milano

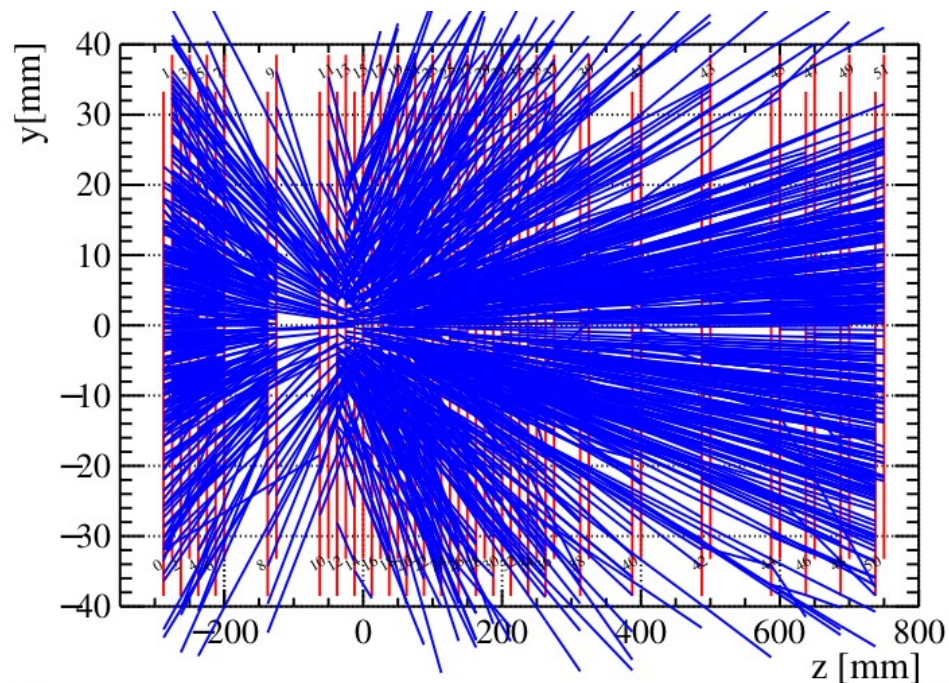
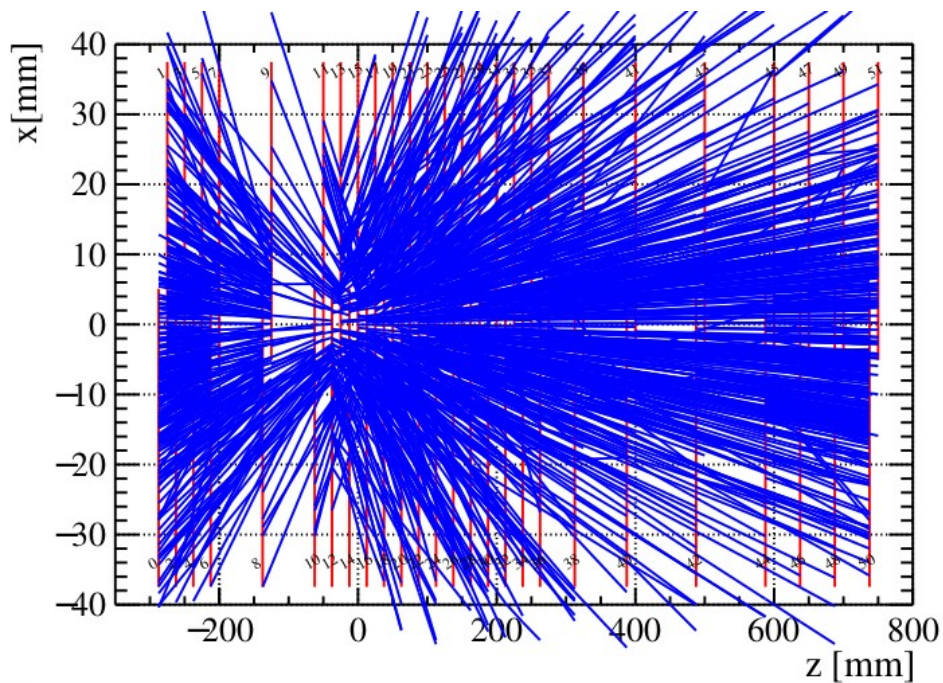
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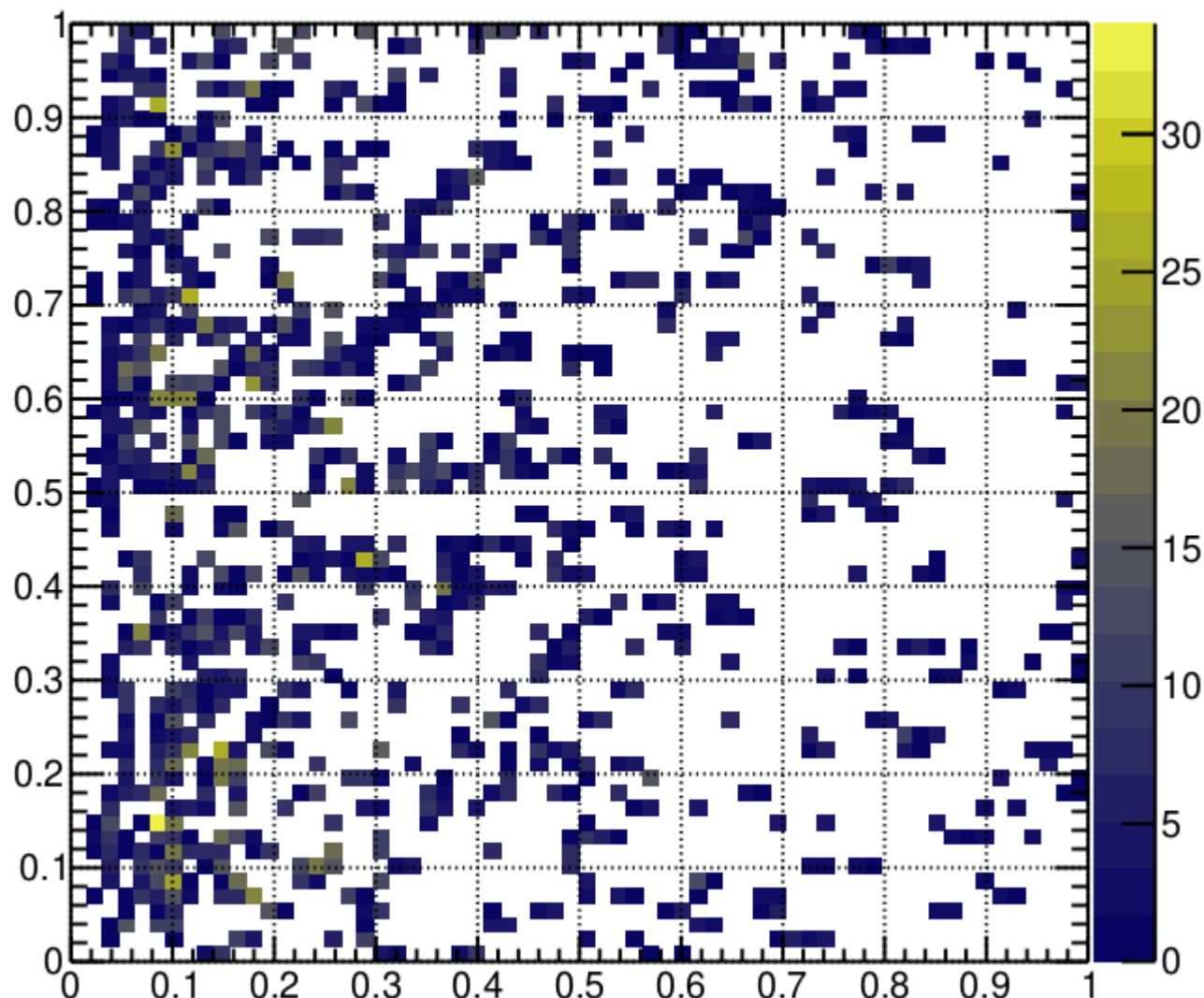
- **Software implementation status**

- Construction of the “True” stubs for the tracks (needed for efficiency calculation) → **DONE**
- Identification of stubs in all the couples of adjacent planes, using the cuts from “standard reconstruction” → **DONE**
- “Tracking Layer” implementation, populated with Engines and 2D histogram for visualization → **DONE**
- Engine implementation, mimicking the actual hardware implementation → **DONE**
  - Receives the stubs
  - Evaluates a binary weight in the central cell and lateral cells
  - Identify a track if the central cell is over threshold and represents a local maximum with respect to the lateral cell
- Quantitative results available in a short time
- Training of the Stub Makers (evaluation of coarse cuts for hardware implementation) → **DONE**
- Training of the Tracking Layer for uniform distribution of the Engines within the Layer → **DONE**

- Example of stubs identified on “True Tracks”
  - Very similar to the full tracks, as expected



- Example of the populated tracking layer
  - Each bin represents the central cell of each Engine
  - Engines distributed in the normalized space of  $(r^+, \phi^+)$  based on “min-max” values
  - The tracking layer is positioned at  $z = 400$  mm
  - After the tracking layer training (based on the quantiles of  $r^+$ ,  $\phi^+$  distribution), the layer will be uniformly populated for better use of the resources



- Inverse normalization functions for R and Phi in the tracking plane at  $z = 400$  mm
  - R function is evaluated based on the Forward / VELO reconstructible tracks
  - Phi function is evaluated from simple theoretical distribution

- Normalized tracking layer
  - normalized space of  $(r+, \phi+)$
  - Green : “true” tracks
  - Red: reco tracks
  - normalized space of  $(r+, \phi+)$  based on the previously evaluated quantiles
  - The tracking layer is positioned at  $z = 400$  mm
- Only “True stubs” have been used (for training)
  - “reco stubs” will be used for the full reconstruction

- All the identified stubs are used to populate the tracking layer
  - The stubs are filtered using the cuts (slope/phi difference cuts) from the standard VELO reconstruction algorithm
- “Crowded” situation
  - Many “reco” tracks not associated with real tracks
  - In particular for low “R” values
- The “standard” cuts are too loose

- Tighter cuts implemented:
  - Evaluated from hits correlation in adjacent layer
  - Training based on the “reconstructible” tracks
  - Better rejection of fake stubs
- Cleaner picture:
  - Fewer identified stubs → reduced contribution to the engines (blue dots)
  - Fewer identified tracks, typically ghost (red circles)

- For each layer:
  - R distribution is evaluated
  - Phi distribution is evaluated
  - R/Phi variables  
normalization functions  
evaluated independently  
from the corresponding  
distribution
- Example is shown for layer 18

- For each couple of layers:
  - R/Phi normalized variables are binned (8, 32 bins)
  - R0/R1 (and Phi0/Phi1) bins correlation is evaluated. Empty bins are not considered in the reconstruction process
  - A candidate stub belonging to an empty bins is not identified
- Example is shown for layer 18-20 (same side)