

recent developments on global tracking

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GSI

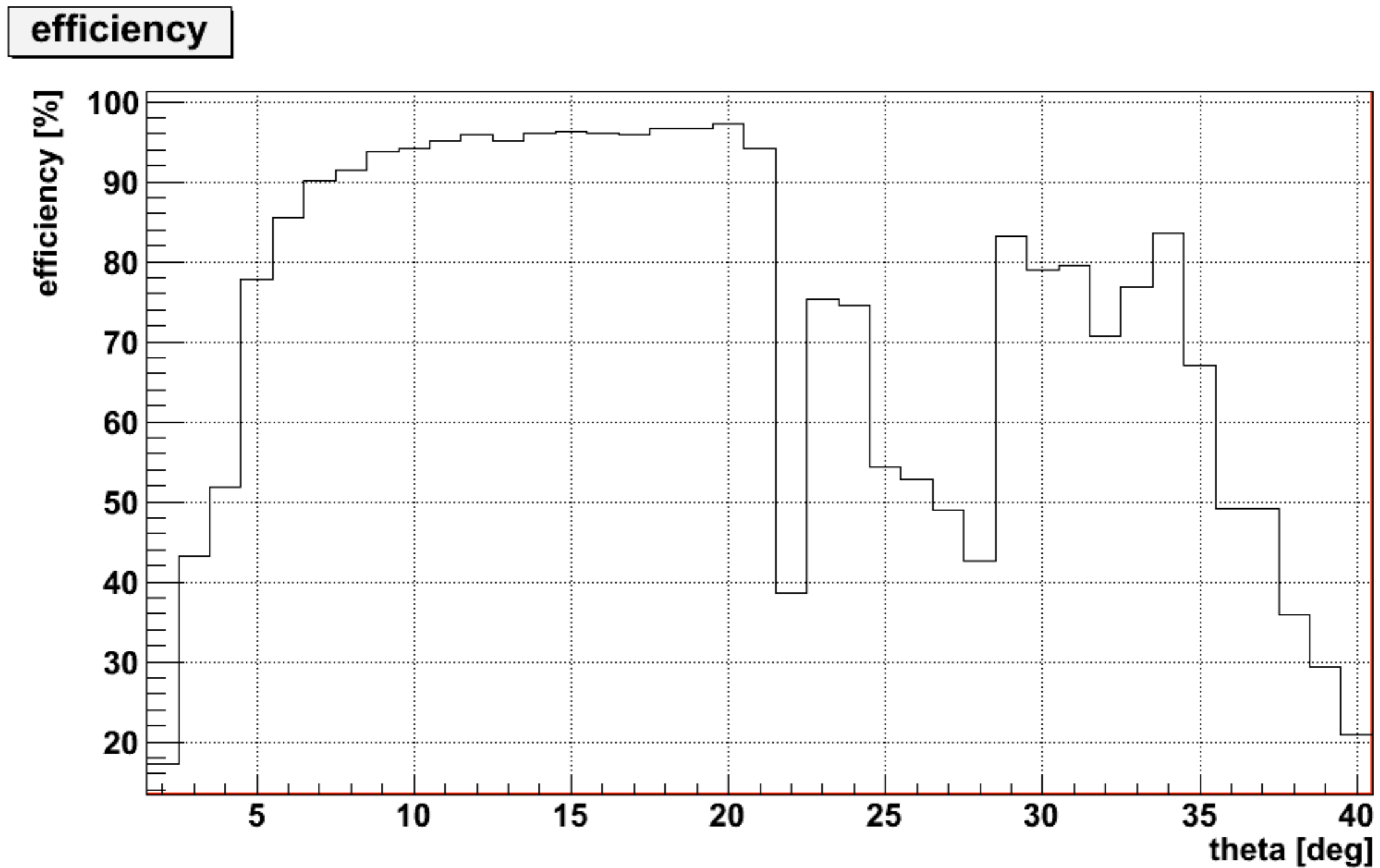
Current status

- standalone detector trackers:
 - **MVD** (Tobias/Ralf)
 - **STT** (Gianluigi)
 - **TPC** (Felix)
 - **GEM** (Radek)
- merging the standalone tracks:
 - **global track merger** (Radek)
- few attempts to combine various detectors:
 - **MVD+STT** (Gianluigi)
 - **MVD+GEM** (Radek)
 - **general LHE tracker** (Stefano)
- and many more

MVD-GEM track finder

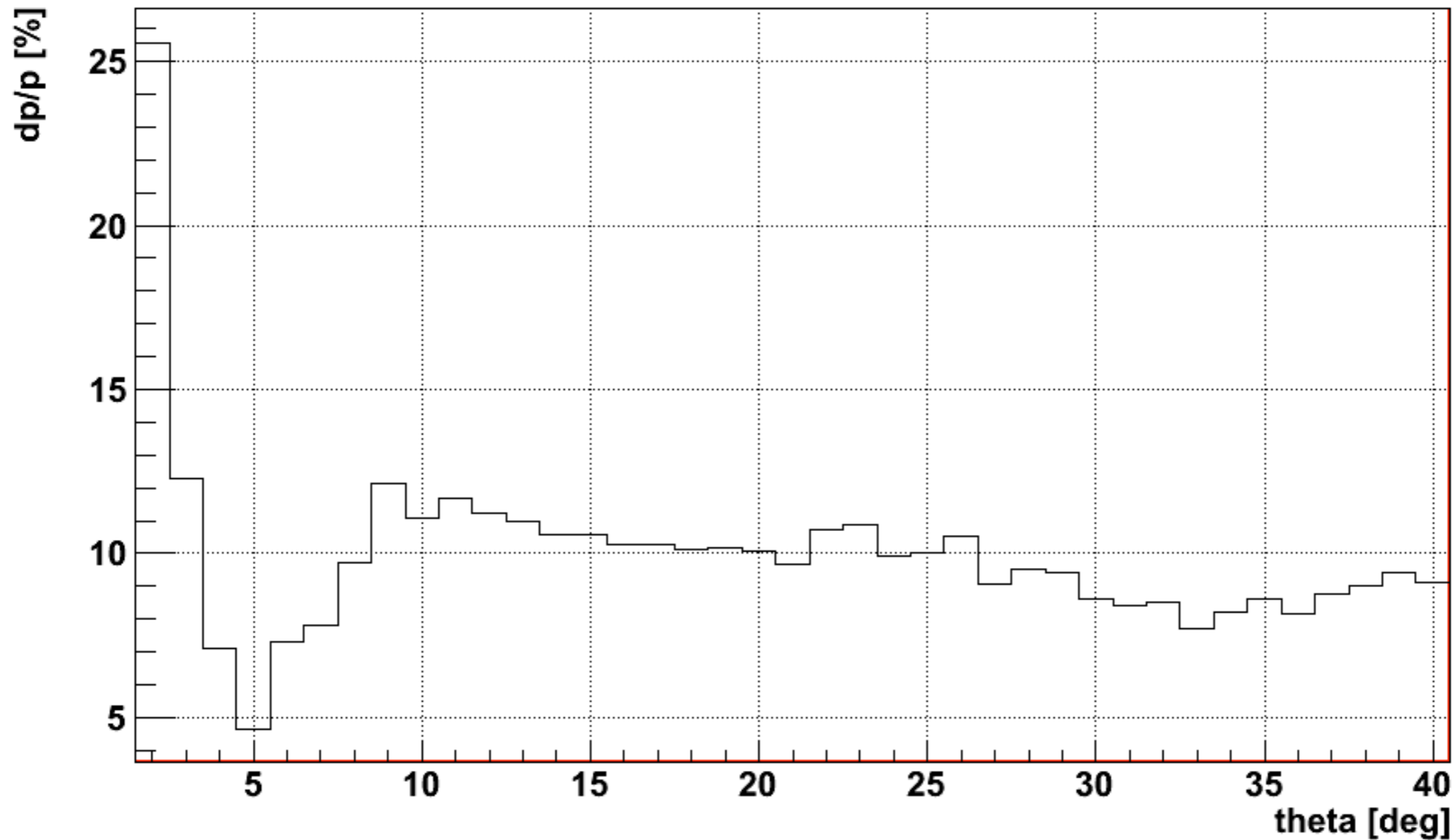
- Simple extension of the existing GEM track finder:
- create pairs of hits (MVD or GEM) with different z , close in radius and ϕ
- calculate momentum assuming the track is primary
- merge the pairs with momentum information into tracks
- clean the array of tracks (remove ghost, merge clones)

Results - efficiency

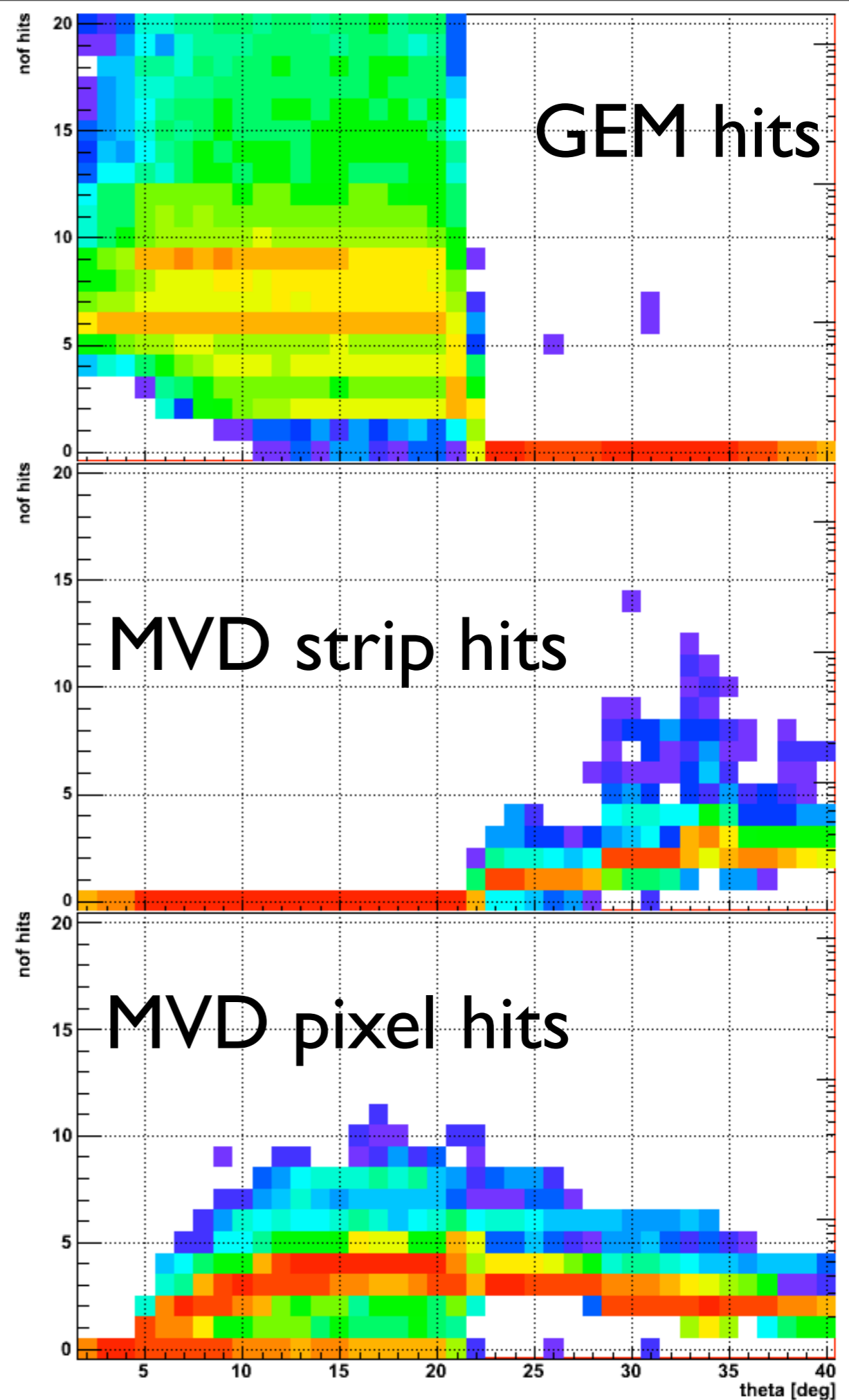


Results - resolution

Momentum resolution



Results - number of hits



Barrel Track Finder

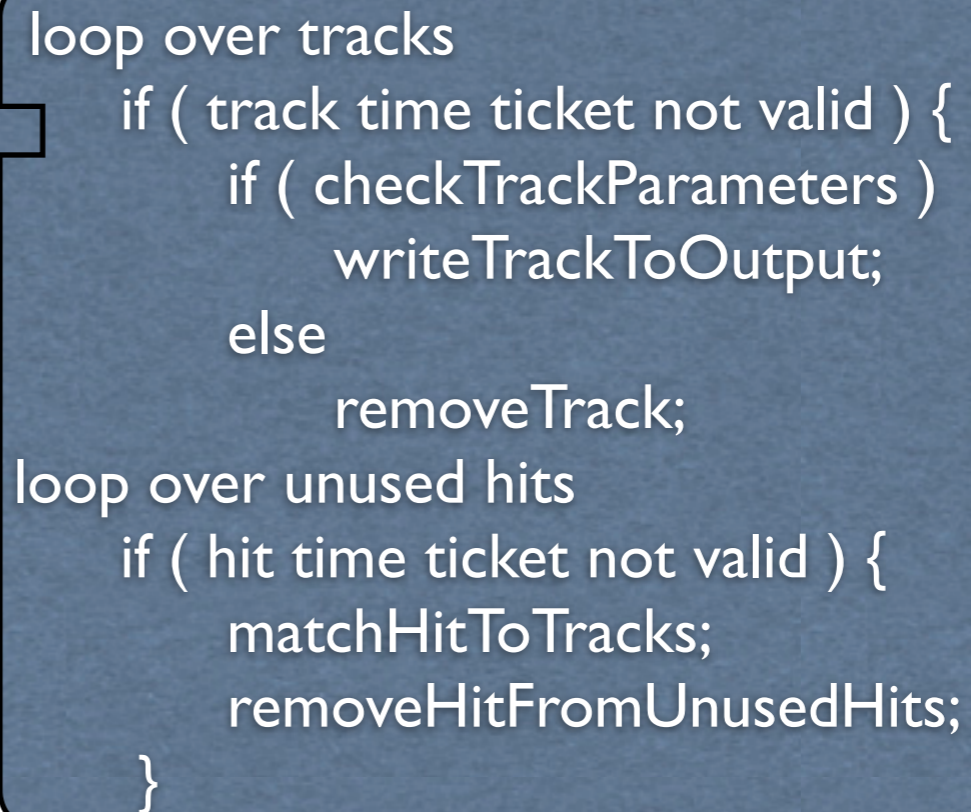
- Combine all the different central detectors: MVD, STT, TPC, GEM
- Imply some simple track model: helix (so the tracking assumes magnetic field to be constant)
- Focus on primary tracks

Pattern of action

```
loop over hits {  
    loop over tracks  
        if ( hit belongs to track )  
            addHitToTrack;  
    if ( hit belongs to any track ) continue;  
    loop over unused hits  
        if ( hit and unused hit match )  
            createTrack;  
    if ( hit matched with any unused hit ) continue;  
    addHitToUnusedHits;  
}
```

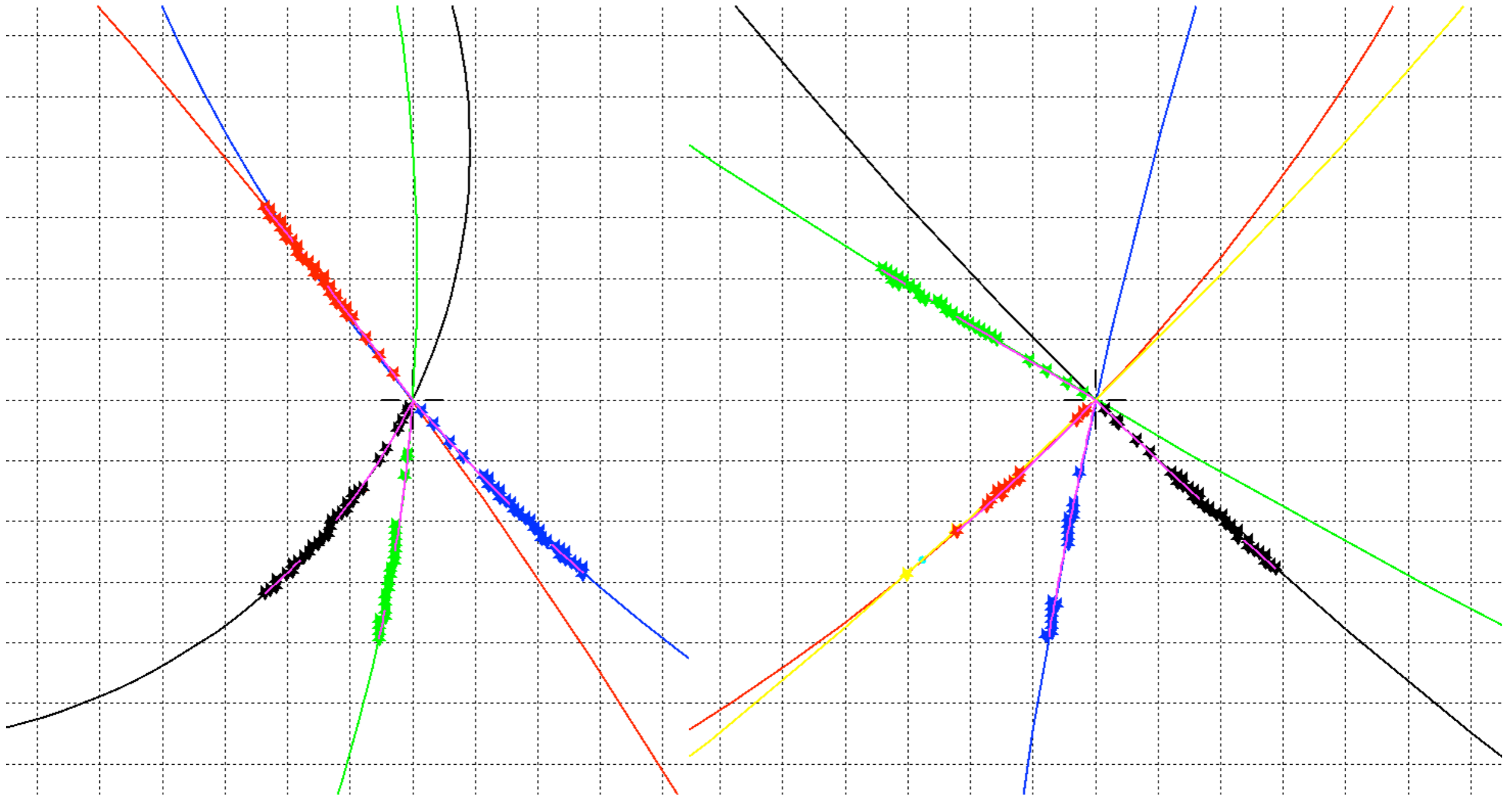

Simple extension

```
loop over hits {  
  loop over tracks  
    if ( hit belongs to track )  
      addHitToTrack;  
  if ( hit belongs to any track ) continue;  
  loop over unused hits  
    if ( hit and unused hit match )  
      createTrack;  
  if ( hit matched with any unused hit ) continue;  
  addHitToUnusedHits;  
}
```

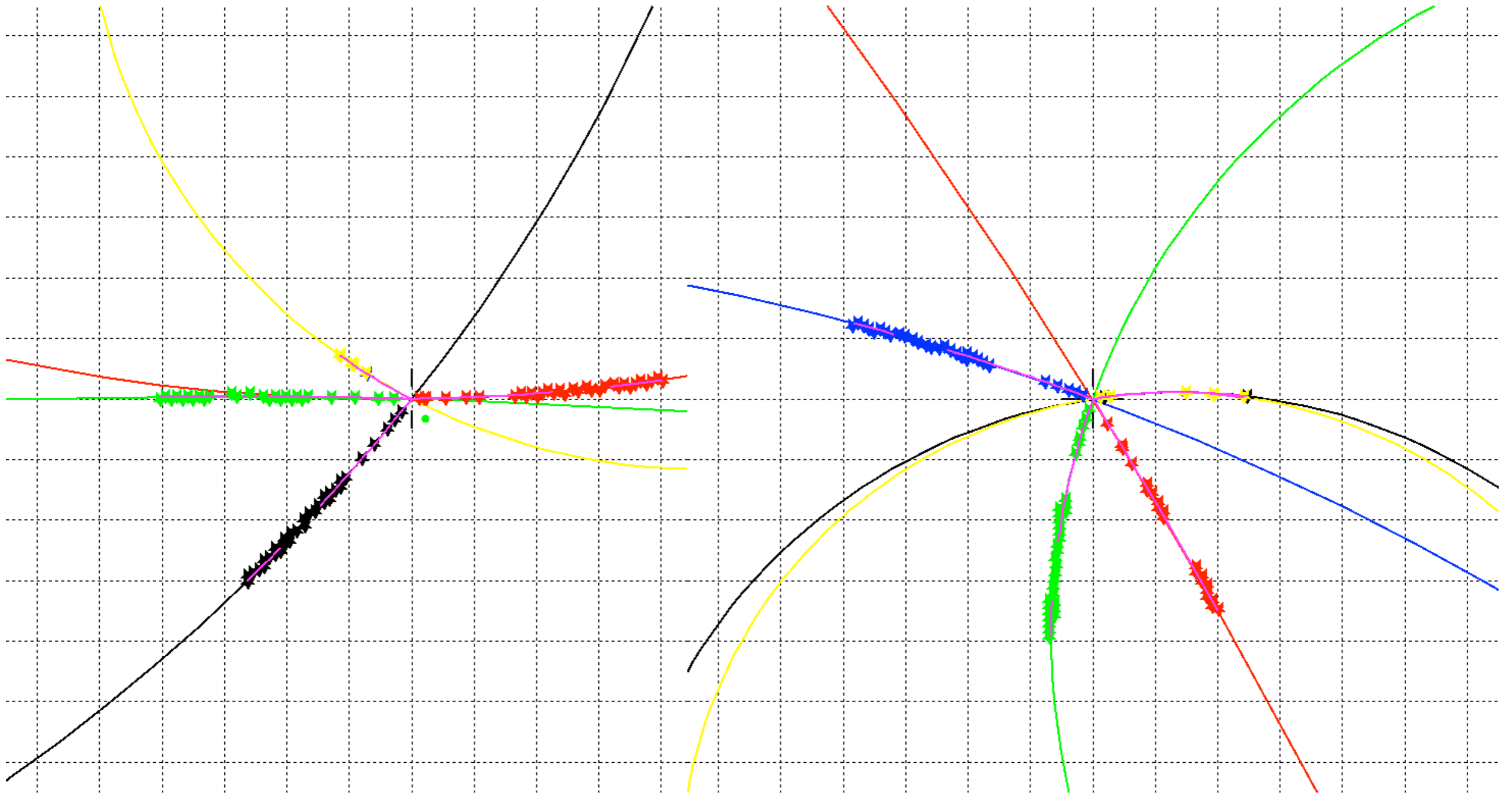


```
loop over tracks  
  if ( track time ticket not valid ) {  
    if ( checkTrackParameters )  
      writeTrackToOutput;  
    else  
      removeTrack;  
  }  
loop over unused hits  
  if ( hit time ticket not valid ) {  
    matchHitToTracks;  
    removeHitFromUnusedHits;  
  }
```

Performance - examples

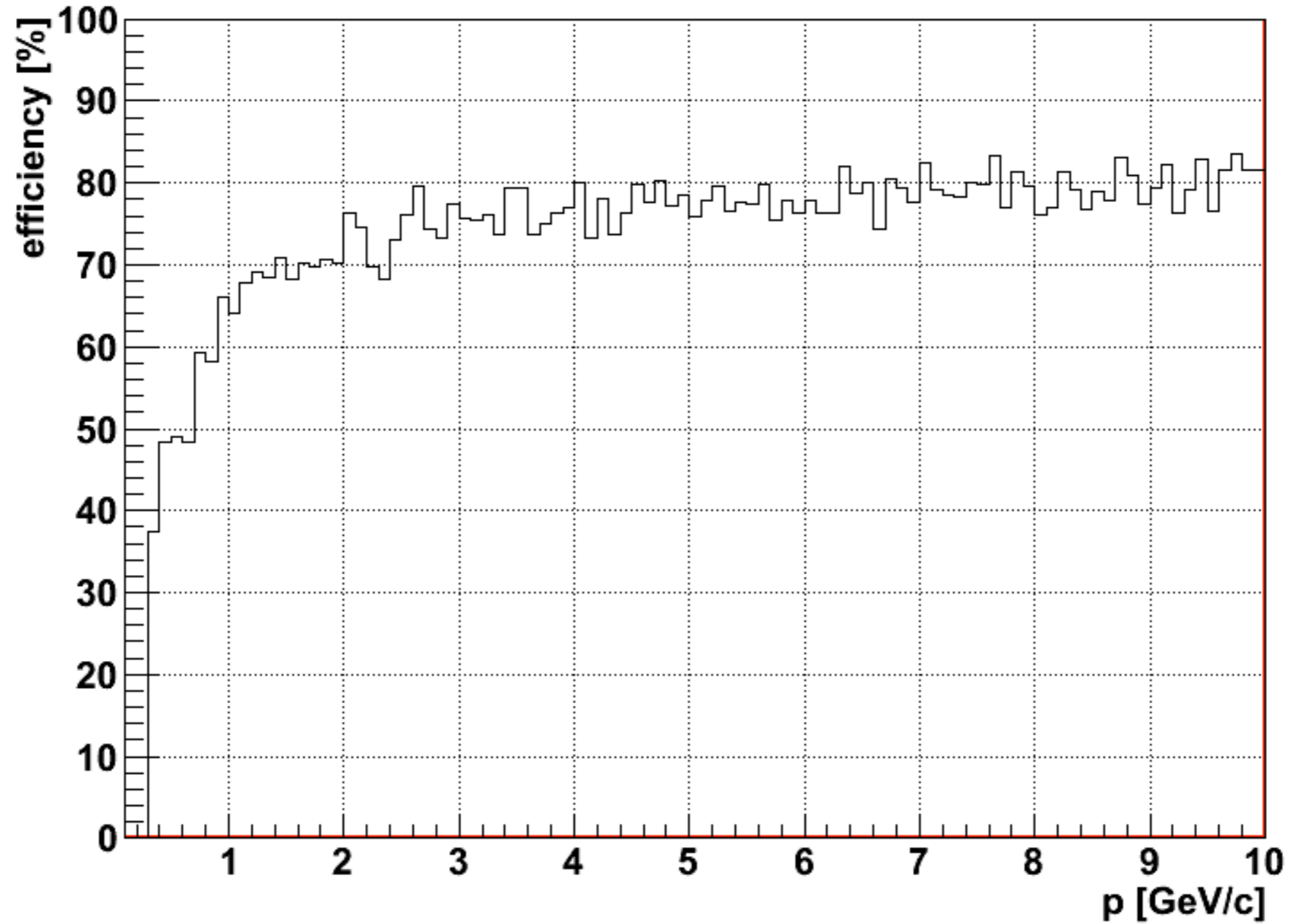


Performance - examples



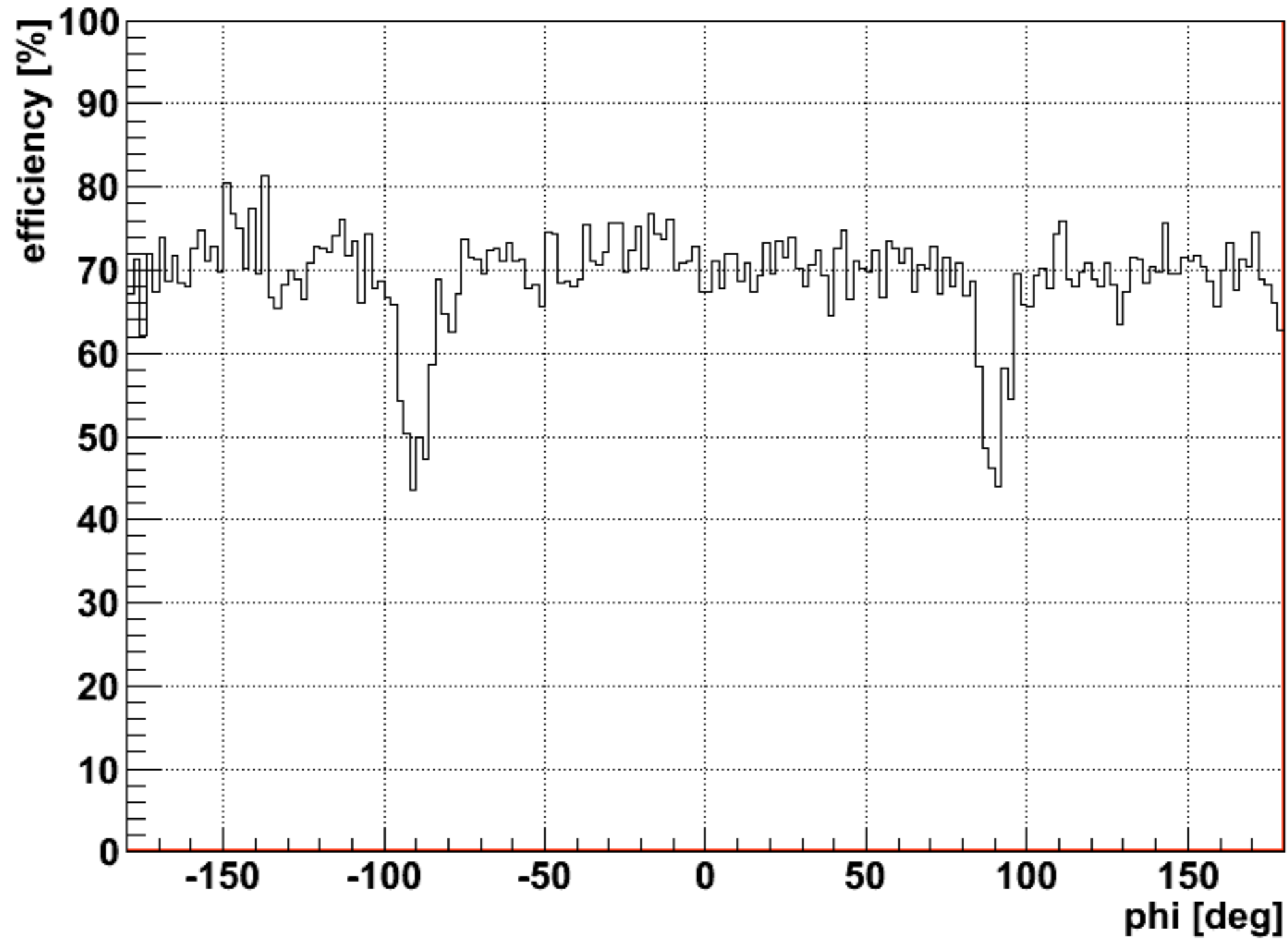
Efficiency vs momentum

Efficiency vs momentum



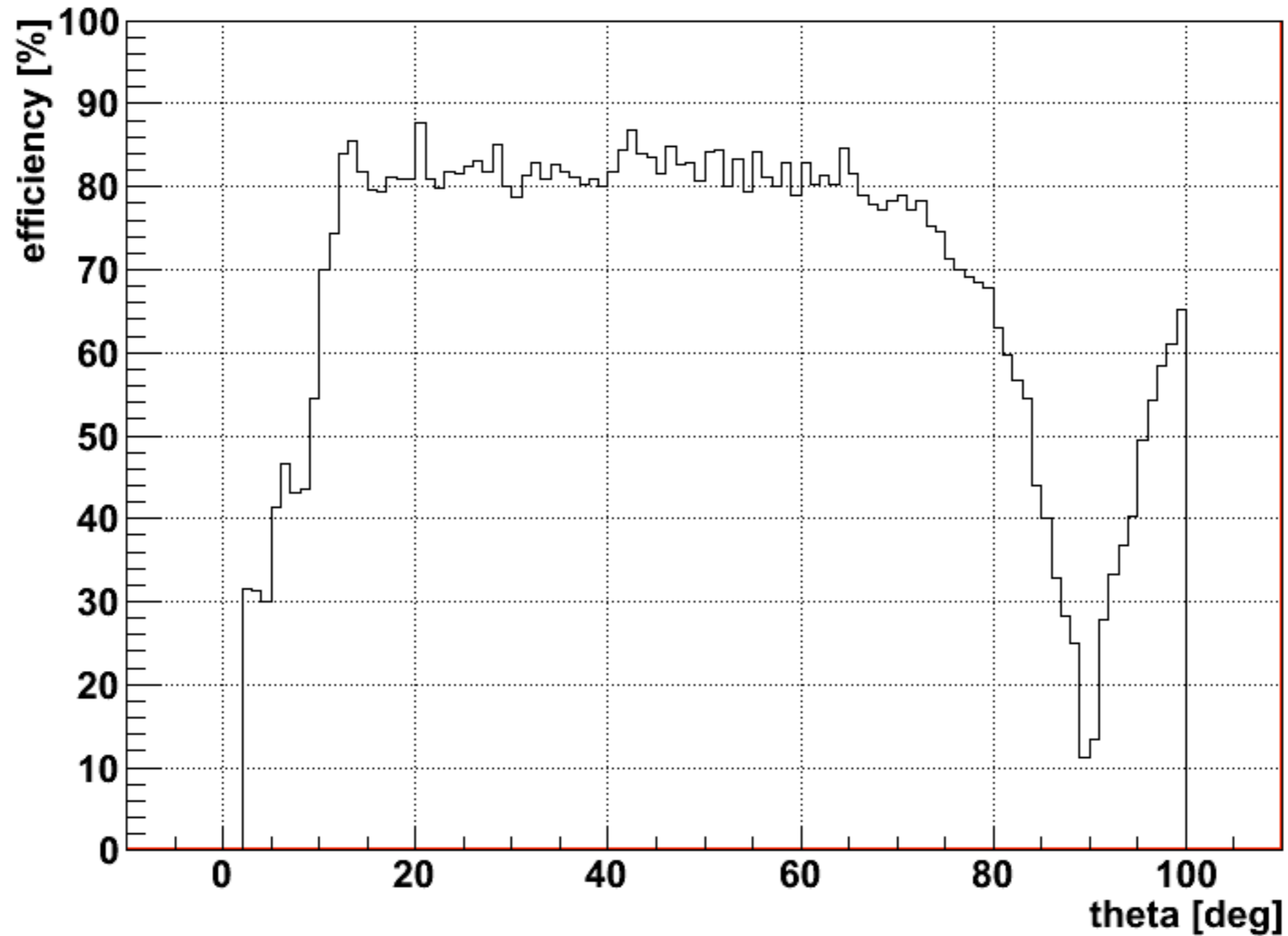
Efficiency vs phi

Efficiency vs phi



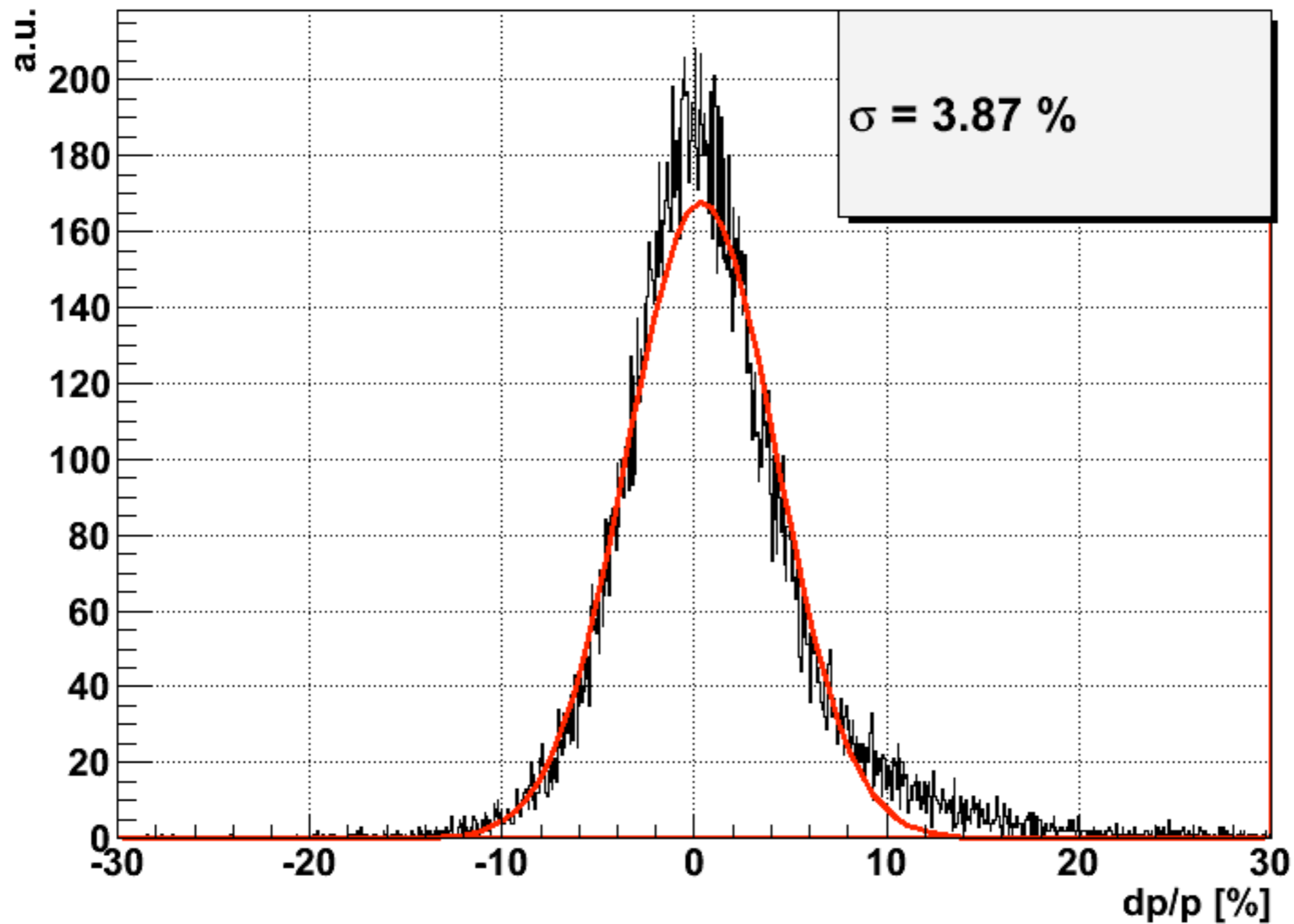
Efficiency vs theta

Efficiency vs theta



Momentum (p_T) resolution

momentum resolution



Life presentation?

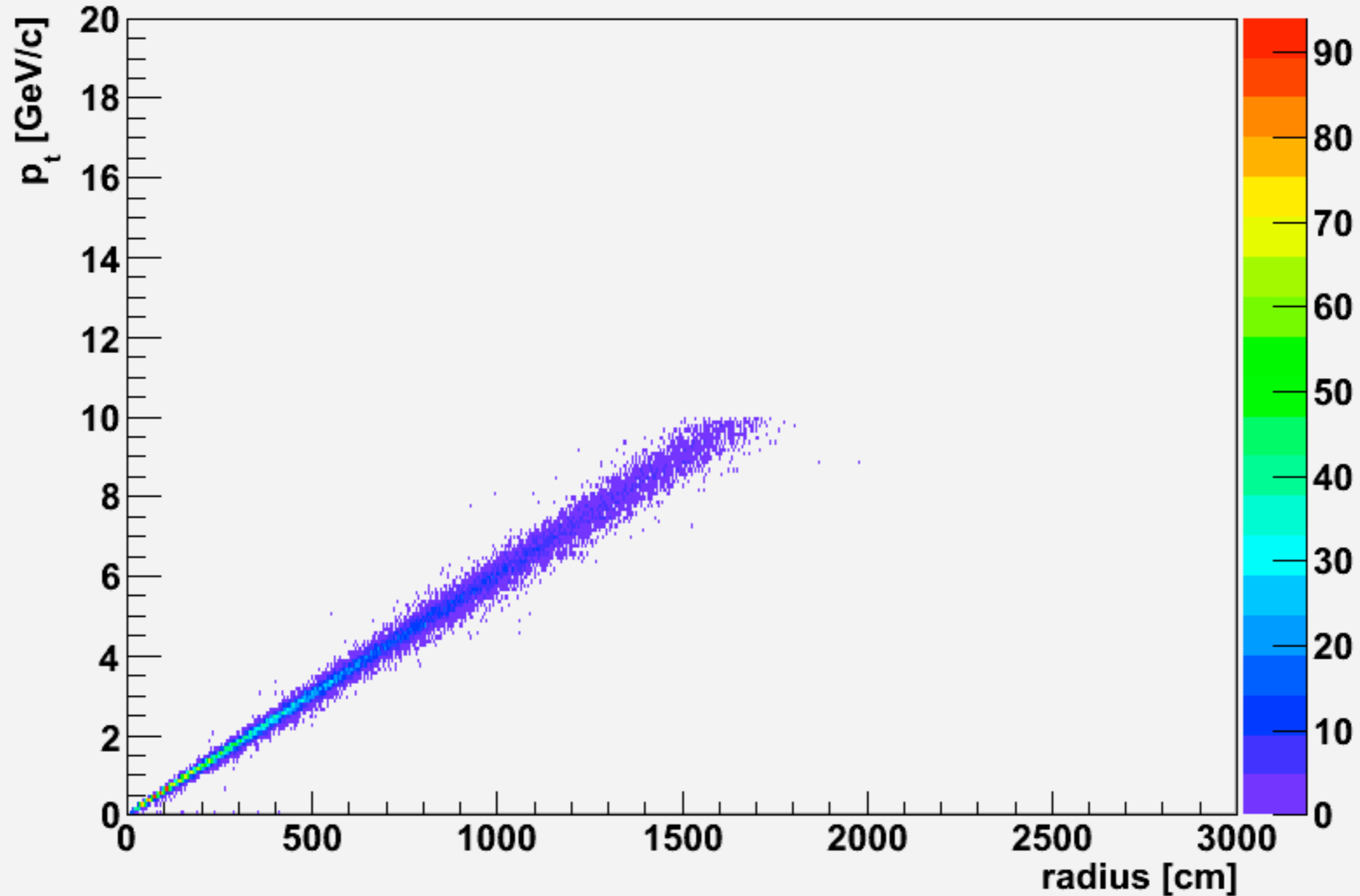
Conclusions

- GEM standalone track finder well tested
- and extended into *somehow* working
MVD-GEM track finder
- Another global/barrel track finder “almost”
ready to use: PndBarrelTrackFinder in
trunk/global

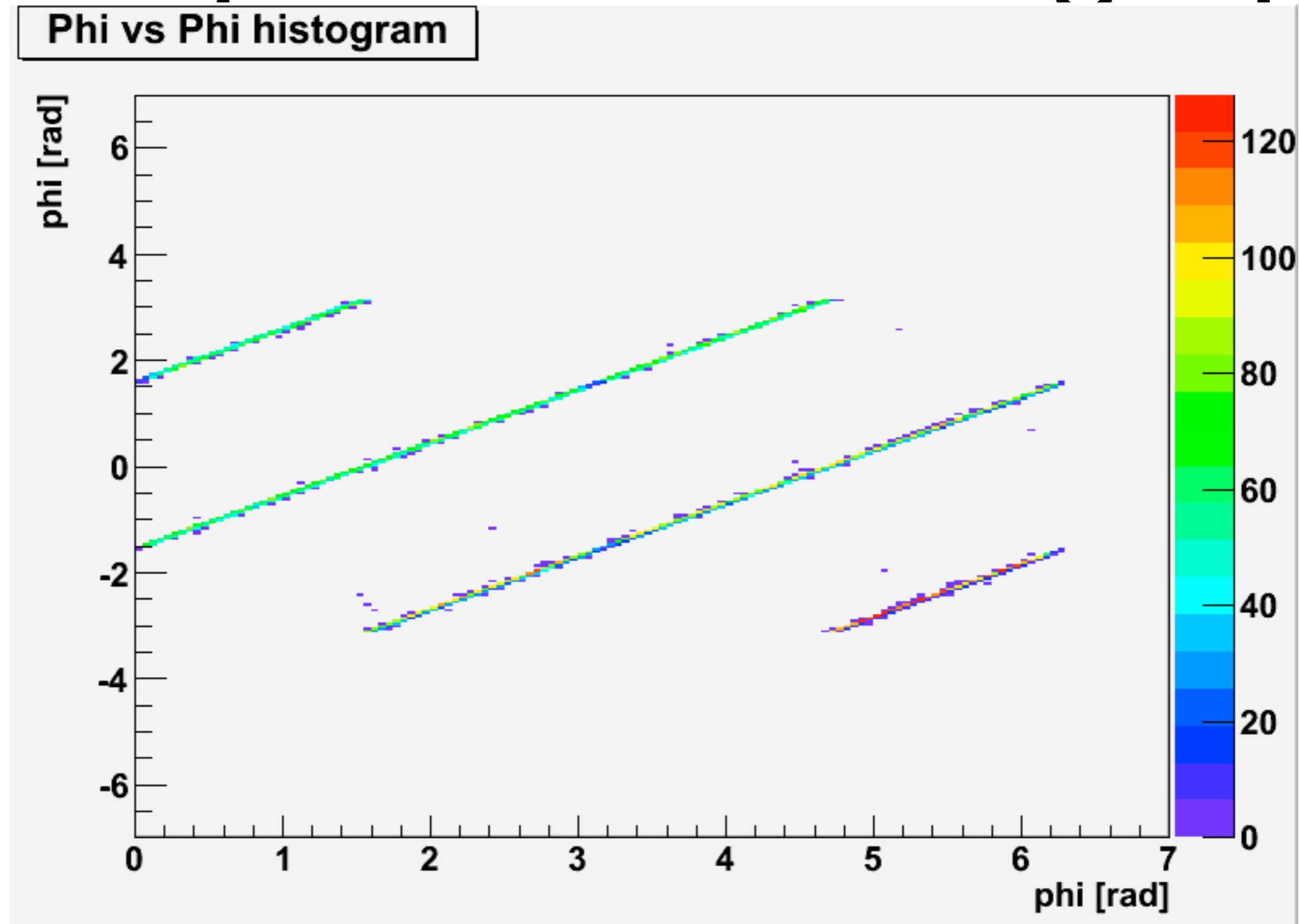
Backup

track P_t vs circle radius

Pt vs Radius histogram



track phi vs circle origin phi



track p_z vs l/p_z

Pz vs P_Z histogram

