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Status of the
Offline
Pattern Recognition
Code

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Present scheme of the offline PR for the central trackers

In the present   PR there are essentially 3 steps :

1) do clusterization with STT axial + SciTil hits only, then do the fit in the XY plane;   find track candidate;

2) attach to track candidate Mvd hits that are near, redo the fit in the XY plane;

3) attach skew Stt hits, do the fit in ΦZ and find remaining Helix parameters;
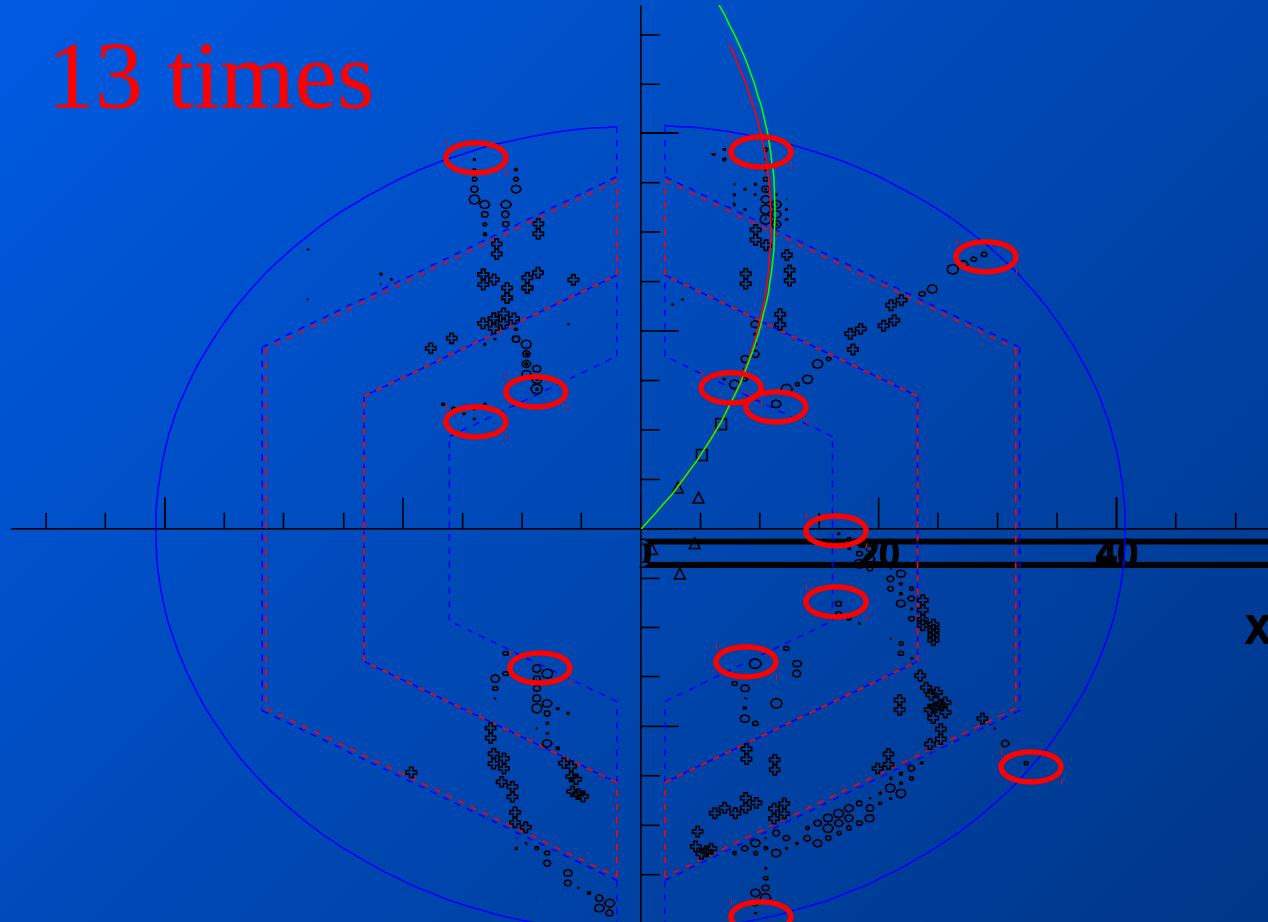
Improvements

Improvements presented in Goa :

1) improvement in the way clusterization with STT axial + SciTil hits only is done;

2) improvement in the way the Mvd hits are attached to a track candidate ;

Change the way the cluster search in XY plane is performed

Improvement : only Stt axial hits on the geometrical boundary of the axial Stt region are considered as possible cluster seed.

13 times

MC truth
reco track

△ Mvd Pixel
□ Mvd Strip
○ Stt Parallel
▬ SciTil

X

20   40

2) improvement in the way the Mvd hits are attached to a track candidate :

Before : require the Mvd hits near (within 5 mm) the circular trajectory in XY plane AND all attached hits must belong to a Mvd Tracklet found previously with the Mvd standalone Riemann Pattern Recognition;

Now : require the Mvd hits near (within 5 mm) the circular trajectory in XY plane;

→ SAVE the Cpu time necessary for the Mvd standalone Riemann PR.

Cpu time consumption (Goa)

…… and now we are at 18 msec /evt , a factor 500 better
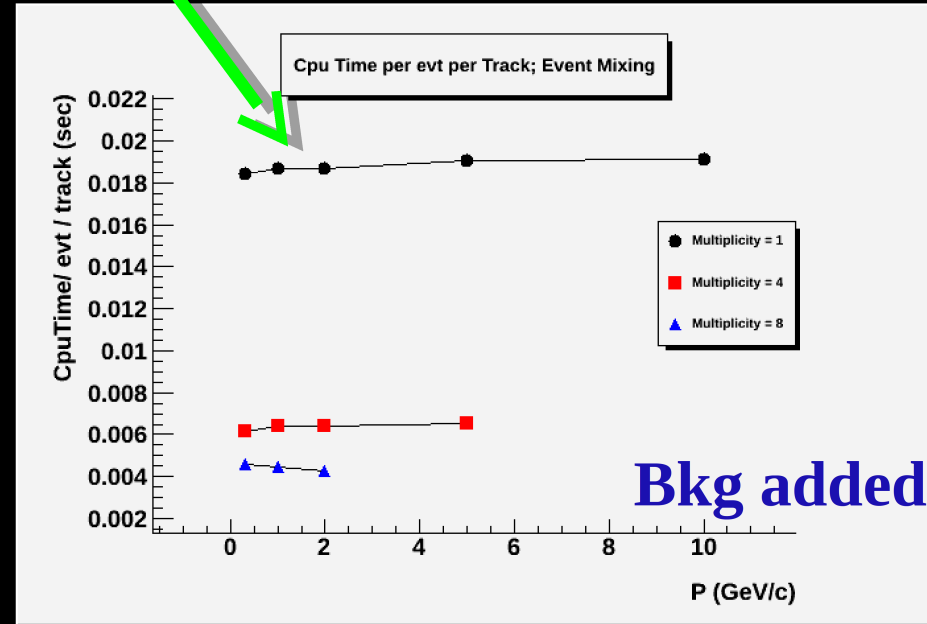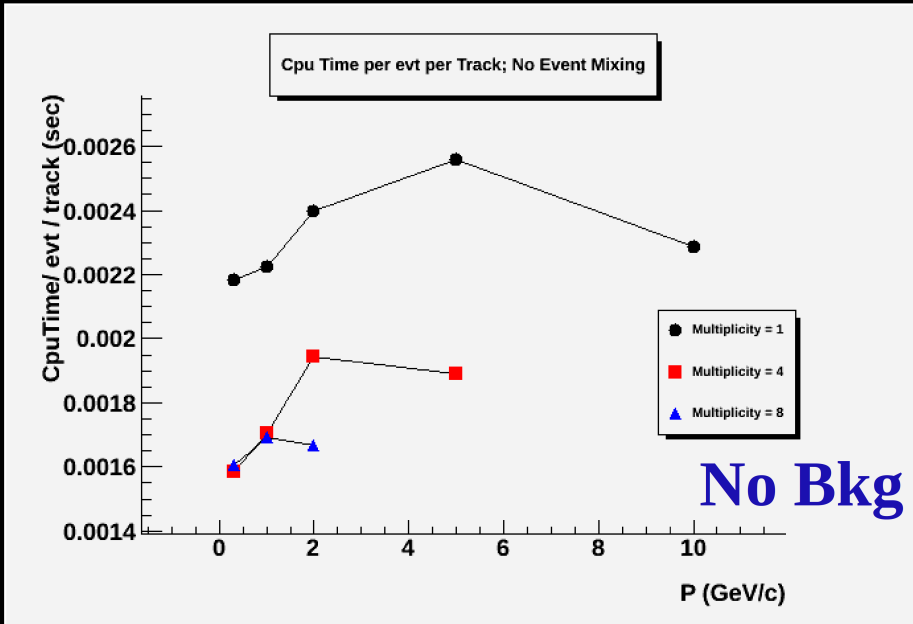
But this is not the end of the story because more improvements can be achieved …….

Efficiency of the present code
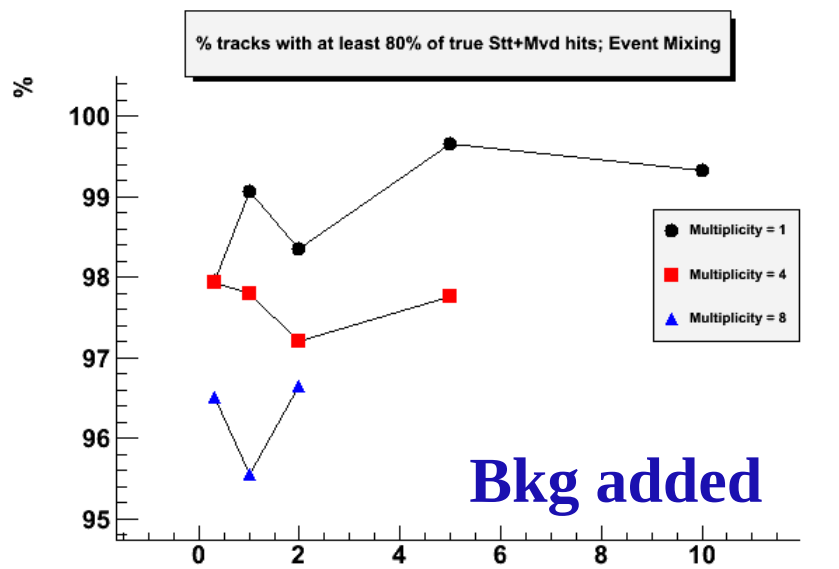## (not presented in Goa)

Track Reconstruction Efficiency

% of reconstructed tracks. In these plots 'reconstructed track' means AT LEAST 80% of the TRUE Stt+Mvd hits.

MC generation : Box Generator;
multiplicities from 1 up to 8; momenta from 0.3 to 10 GeV/c.
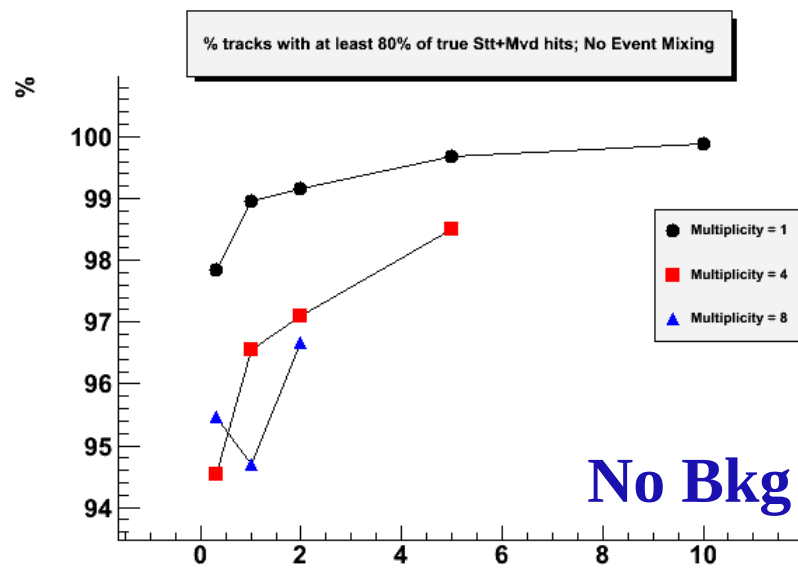
After Goa : further improvements in speed :

construct the tracklets by clusterizing only adjacent (= contiguous straws) STT hits and reject immediately those track candidates that are not continuous or they have no confirmation of a SciTil hit; THIS SHOULD SAVE MORE CPU TIME and eliminates the need of performing a cleanup later;

2) all above can be written in a parallelizable way ; so DO THE PARALLELIZATION;

[3) …… measure the Cpu time on a more modern computer , this alone probably gives a gain of a factor 1.5 – 2]

this cluster is formed because it is contiguous and it is accepted because it is continuous

this cluster is formed because it is contiguous but it is rejected at an early stage because it is not continuous

X

20   40

MC truth
reco track

△ Mvd Pixel
□ Mvd Strip
○ Stt Parallel
▬ SciTil