

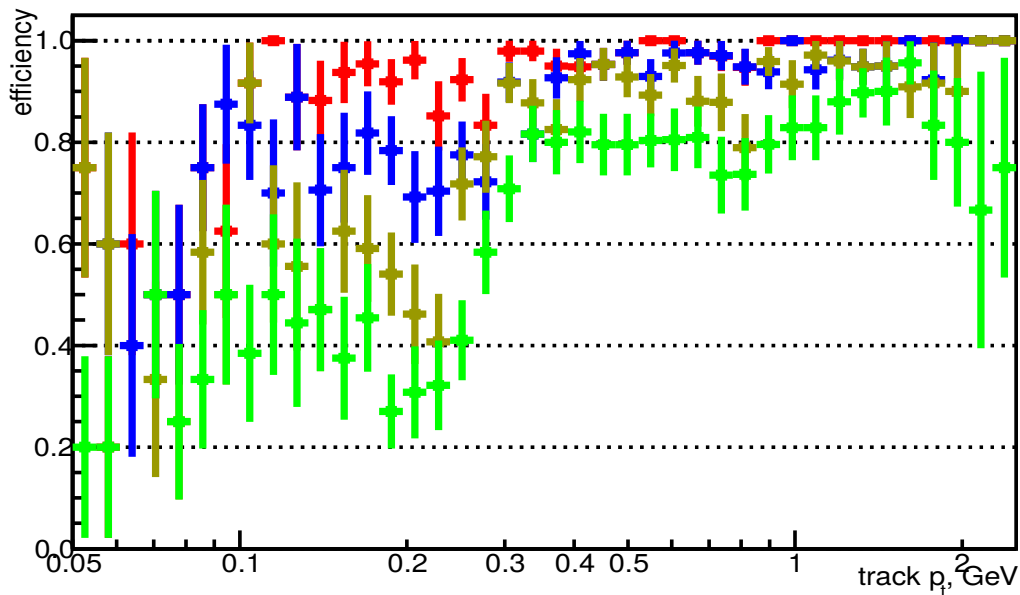
Study of influence of the beam background on the CDC tracking performance

Introduction

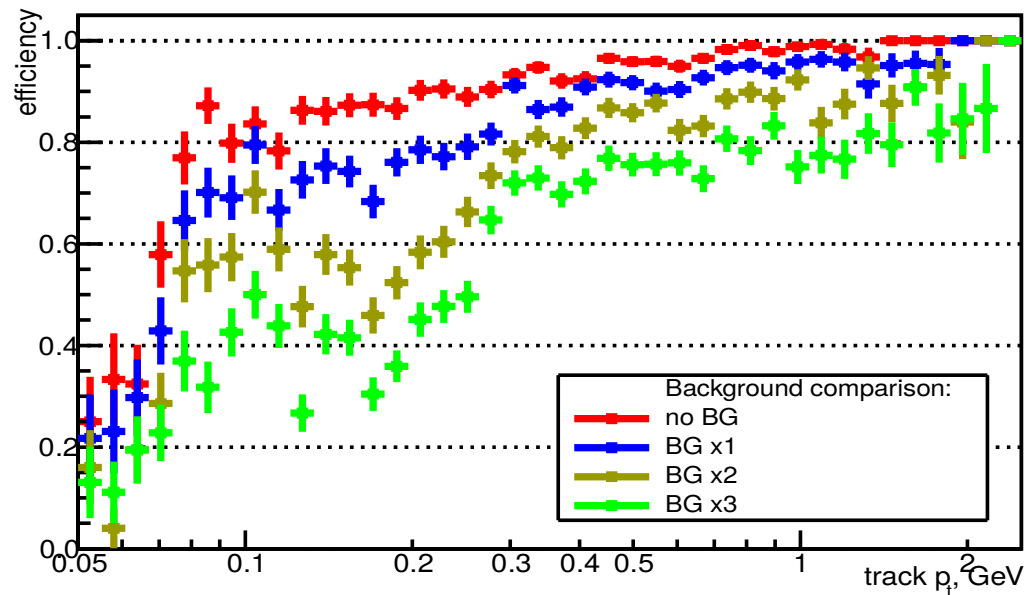
- Generic $B\bar{B}$ simulation was used
- Standard CDC tracking reconstruction was used
 - With BG suppression
- Compared samples:
 - No-BG sample
 - Single BG sample
 - Scaled BG sample

Efficiency in bins of event multiplicity

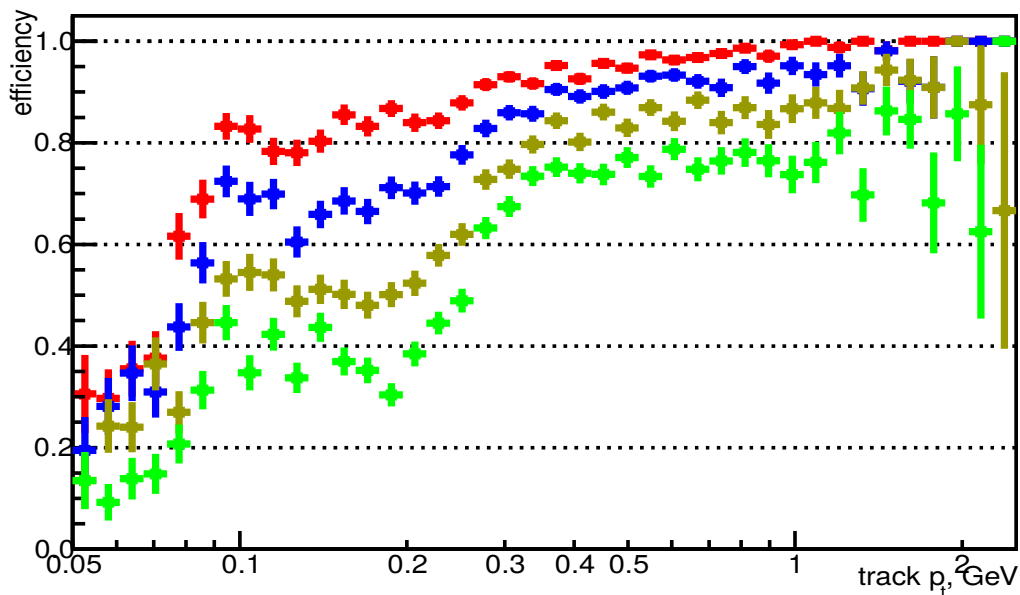
Number of tracks: (2, 8)



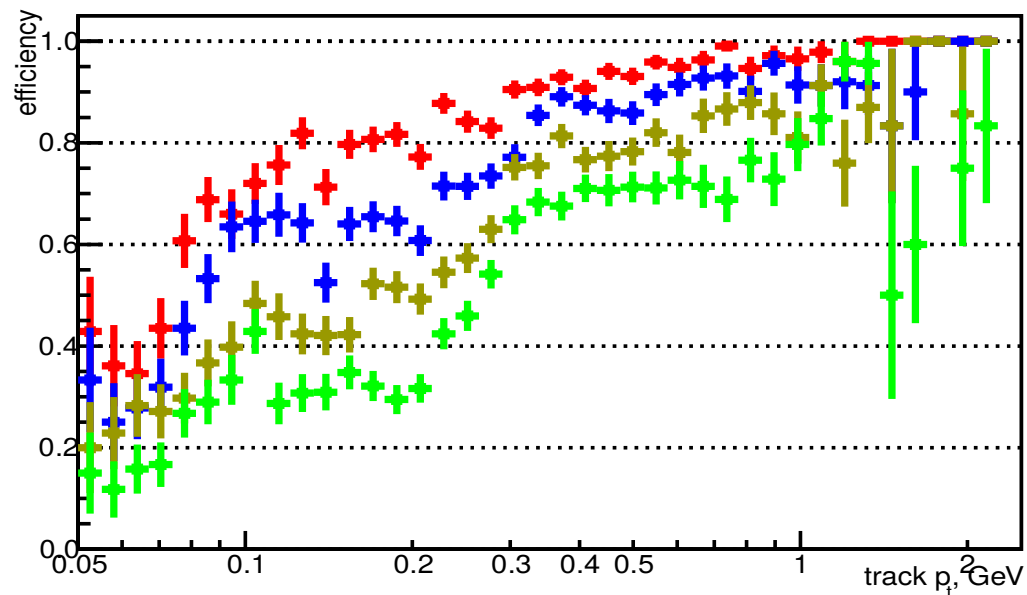
Number of tracks: (8, 12)



Number of tracks: (12, 16)

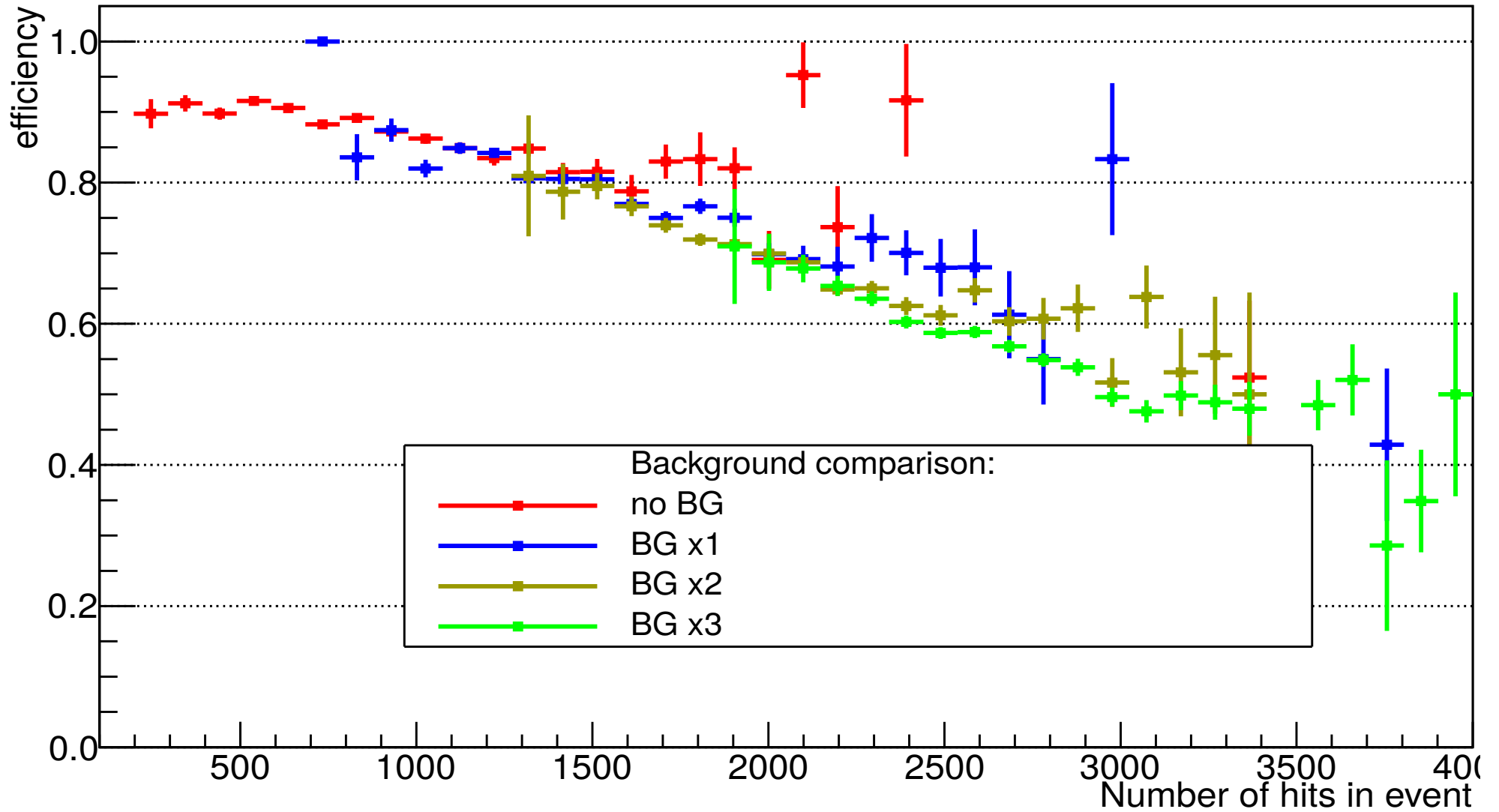


Number of tracks: (16, 20)



11.03.16

Efficiency (dependence on number of hits)

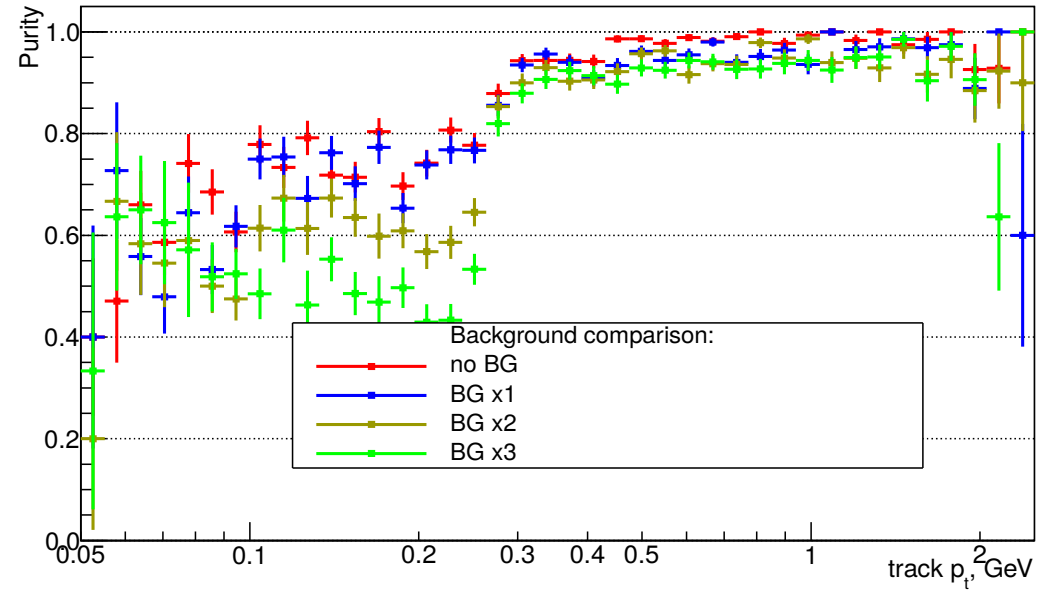
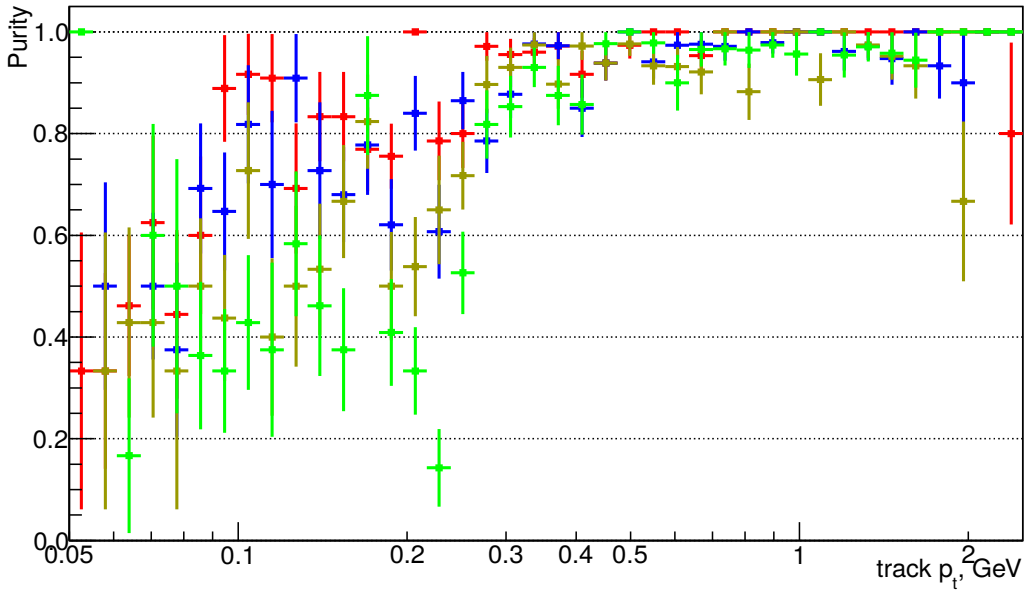


Purity

Purity in bins of event multiplicity

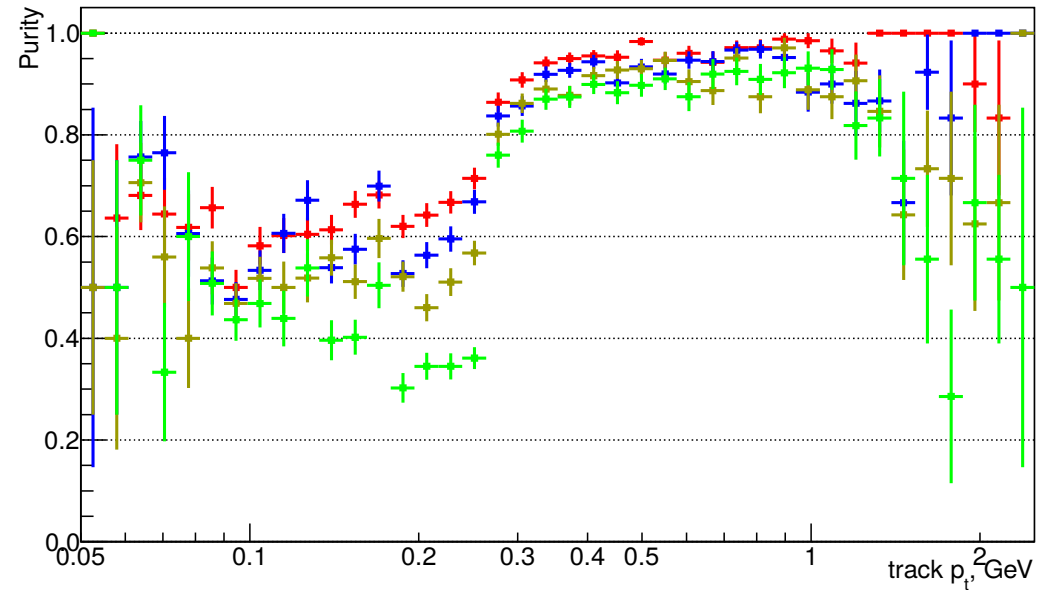
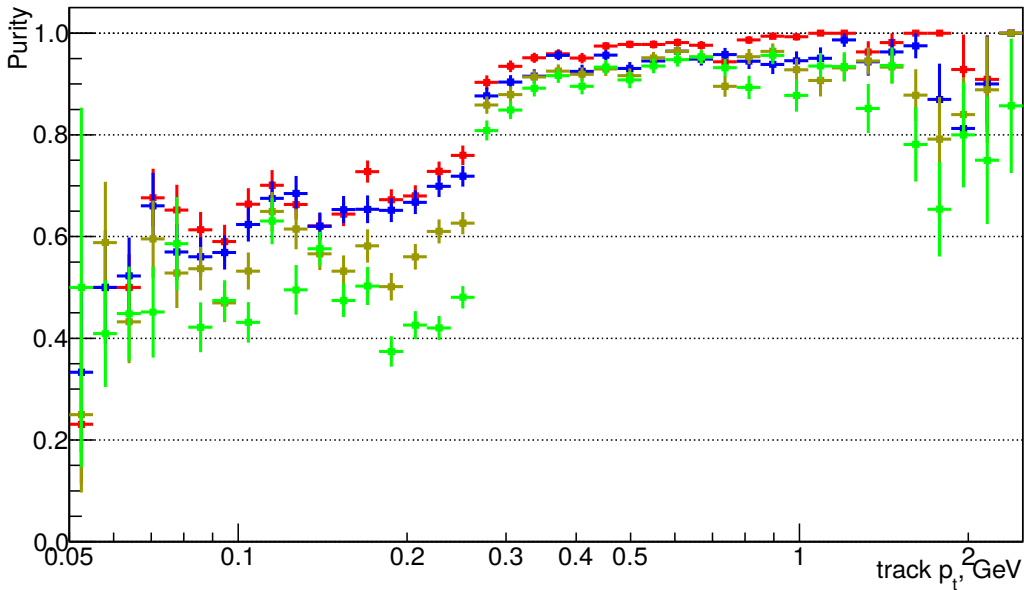
Number of tracks: (2, 8)

Number of tracks: (8, 12)

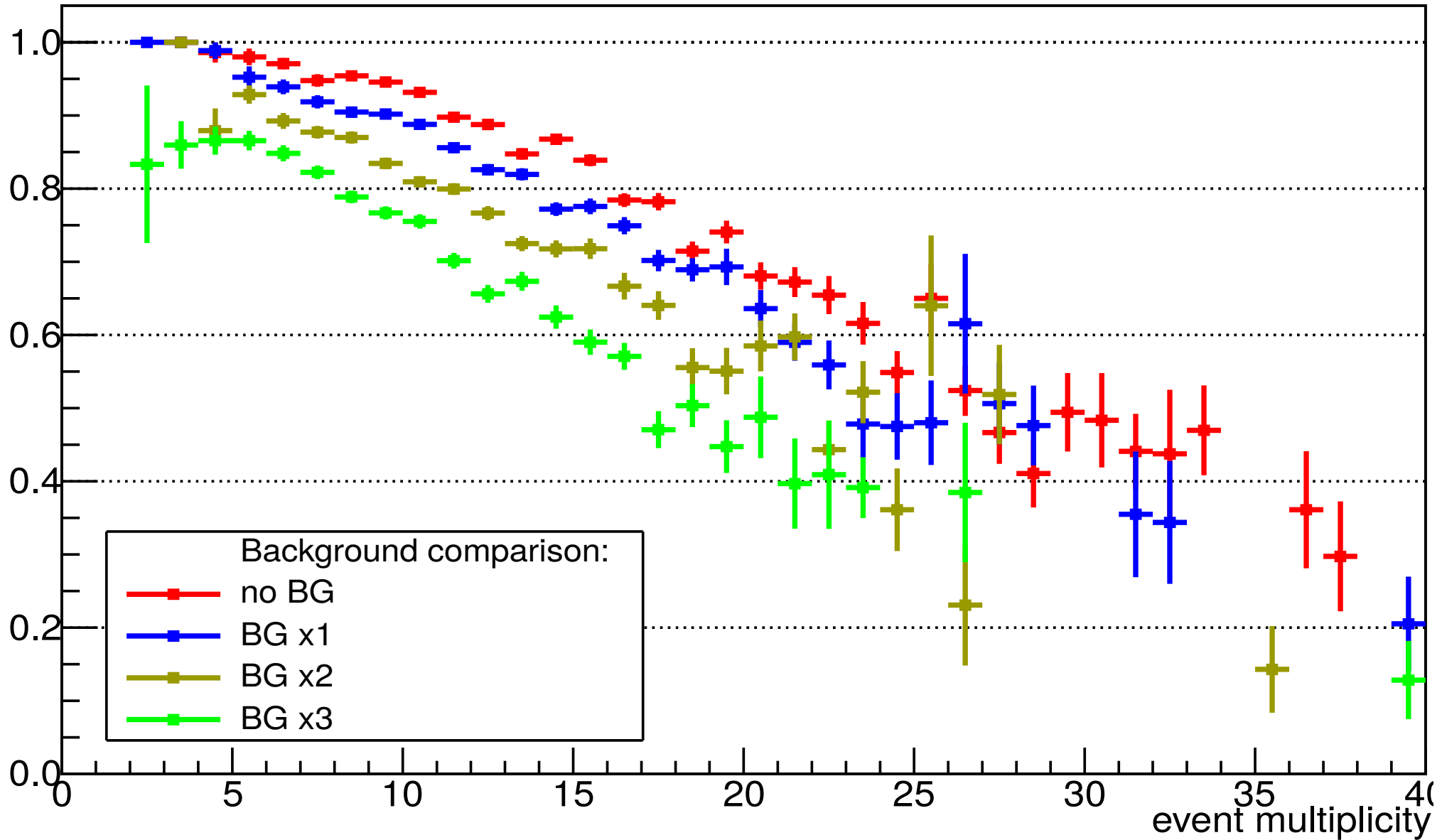


Number of tracks: (12, 16)

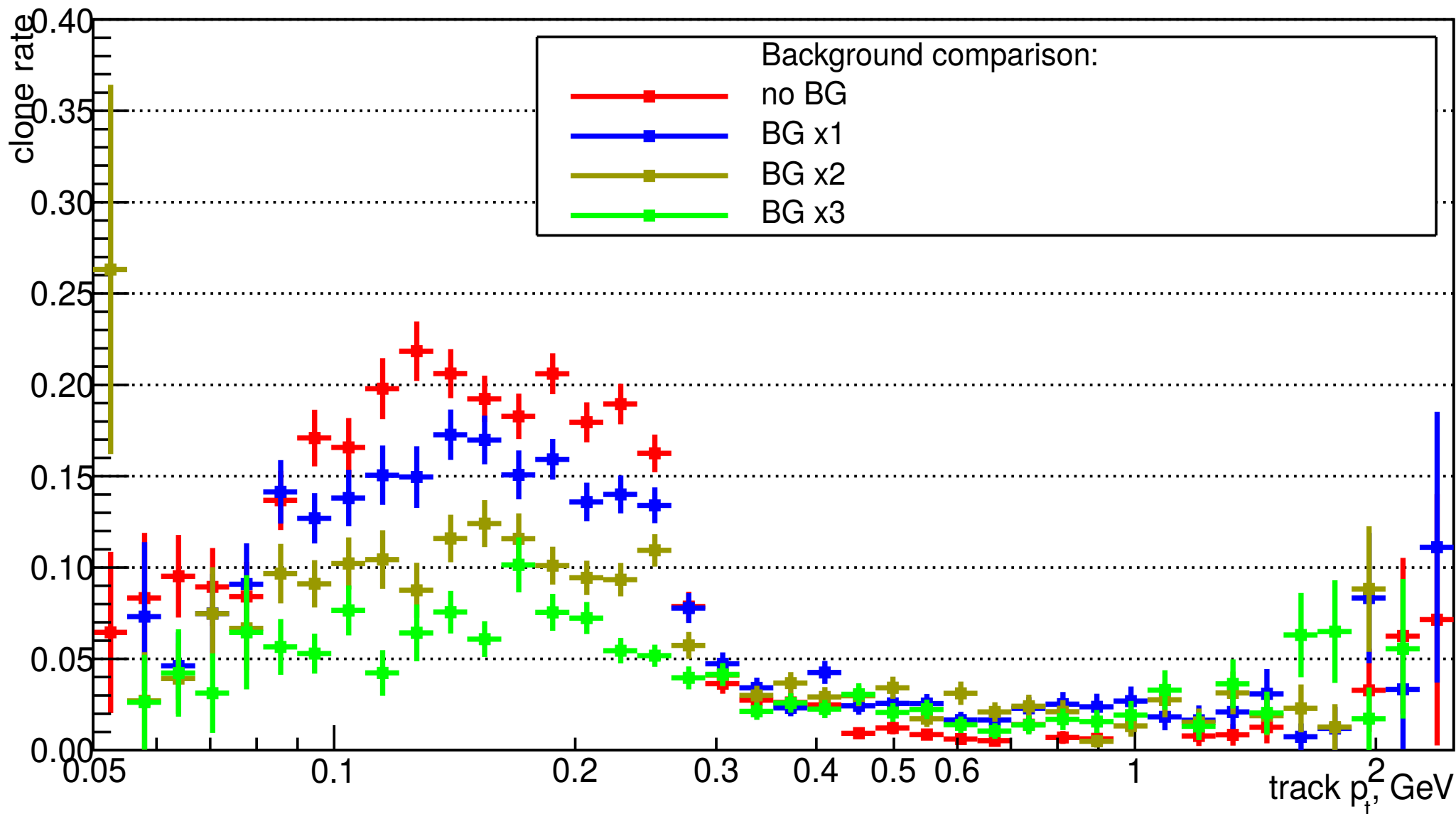
Number of tracks: (16, 30)



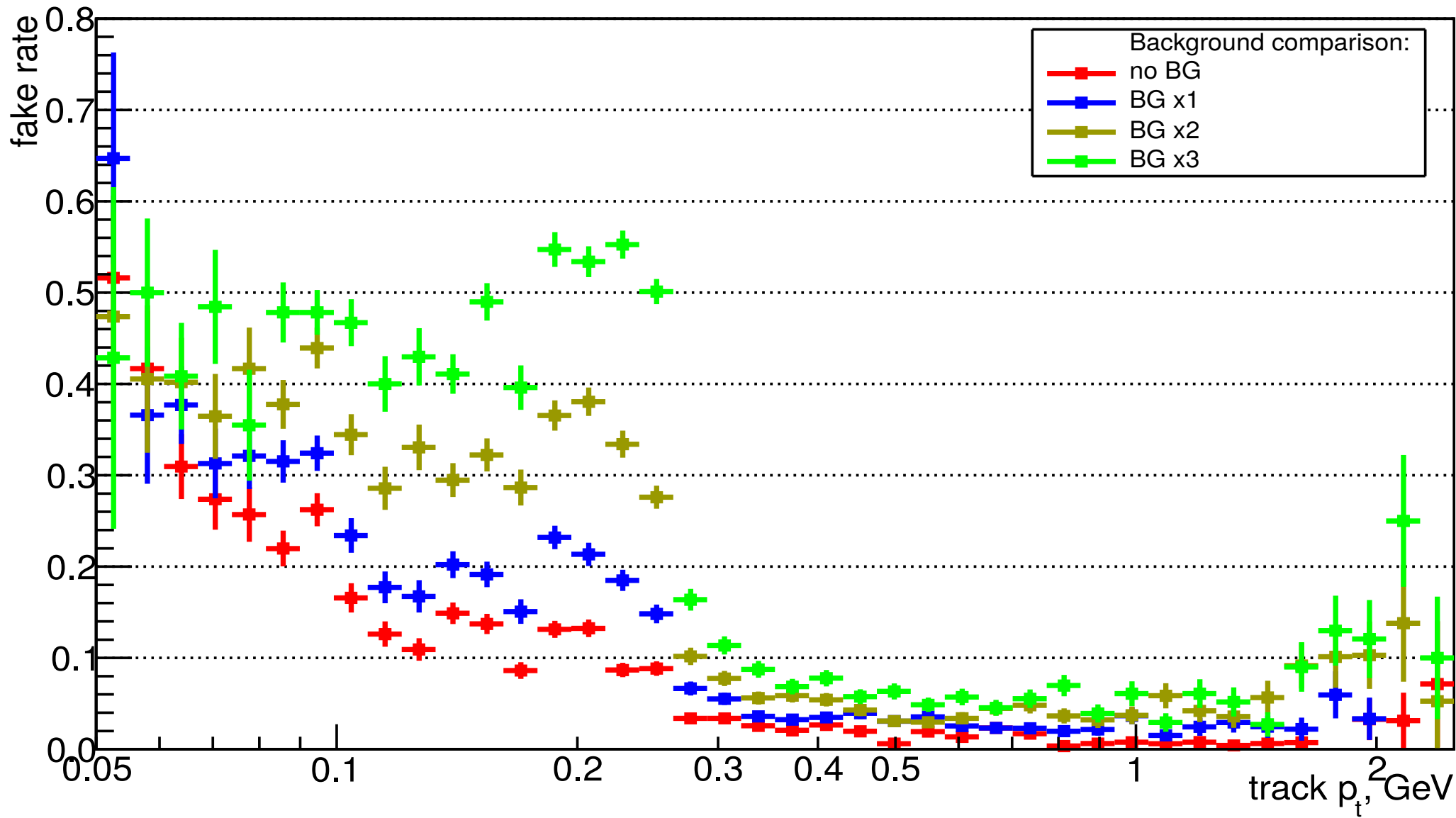
Purity



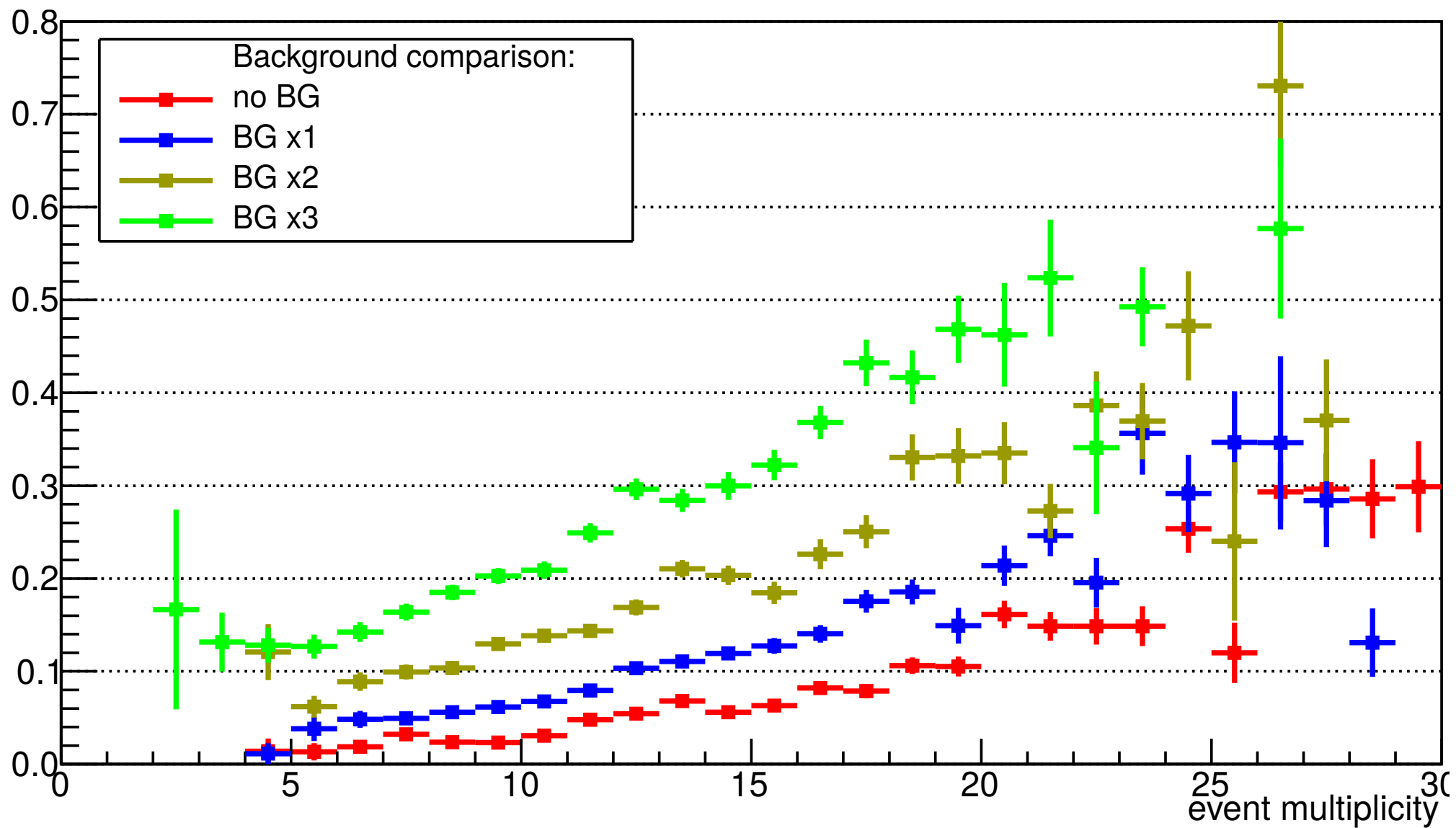
Clone rate



Fake rate



Fake rate

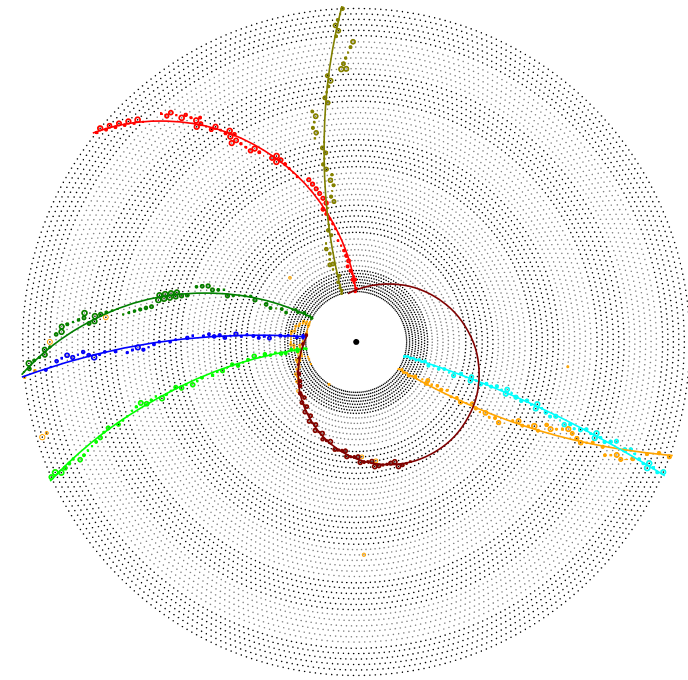


Bug or feature?

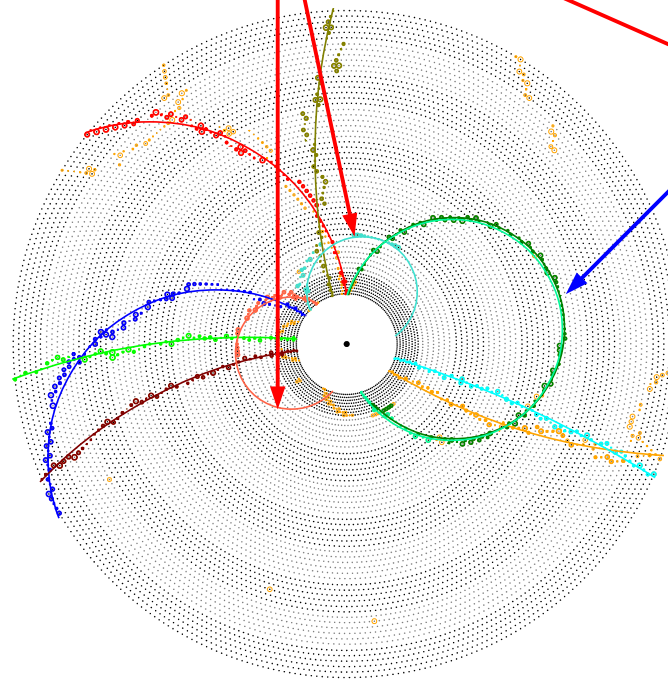
New tracks (after adding new geometry components)

New low-pt tracks?

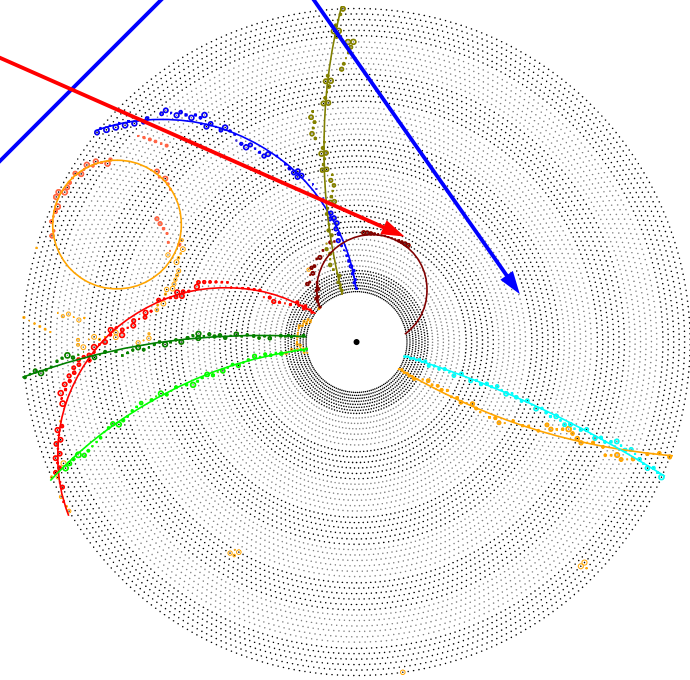
Disappears



BeamPipe
+PXD+SVD+CDC
+ECL



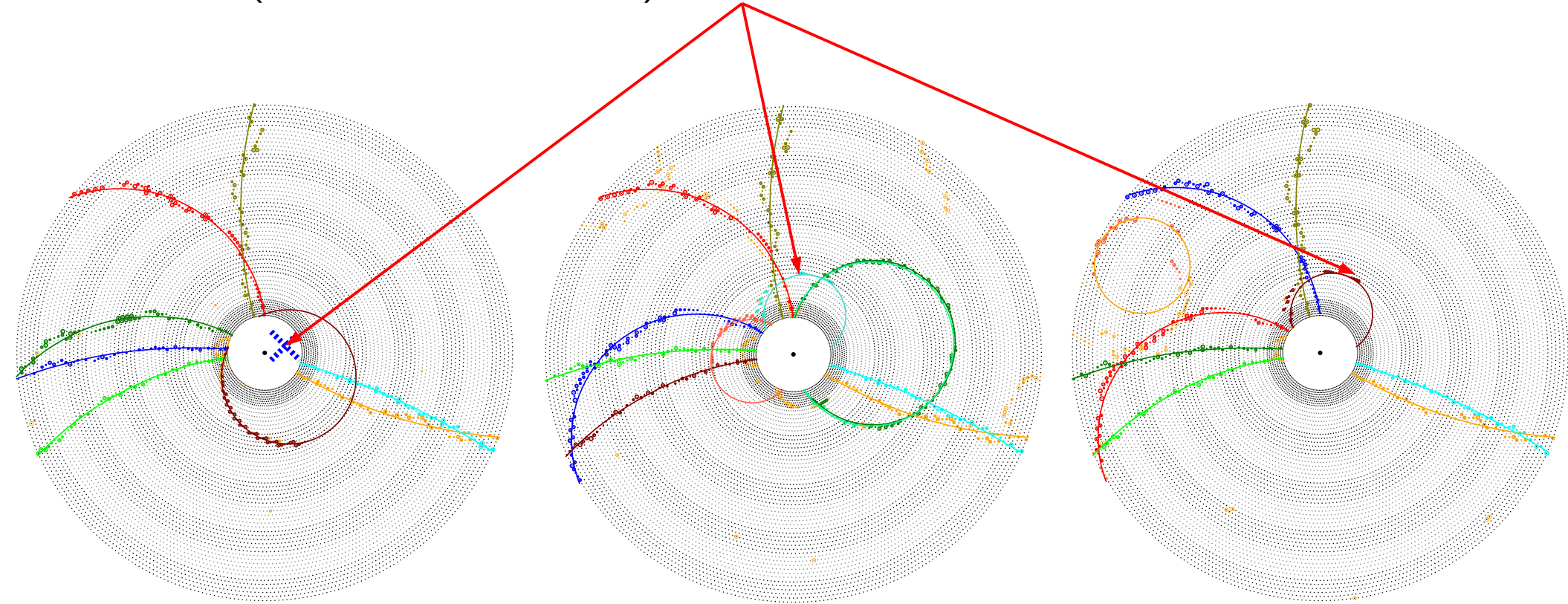
BeamPipe
+PXD+SVD+CDC
+ECL
+TOP



BeamPipe
+PXD+SVD+CDC
+ECL
+TOP+ARICH

New tracks?

This track is the daughter of K^- , corresponding MCParticle exists in all simulations
But, in 1st (without TOP and ARICH) it has different kinematics and don't reach CDC volume



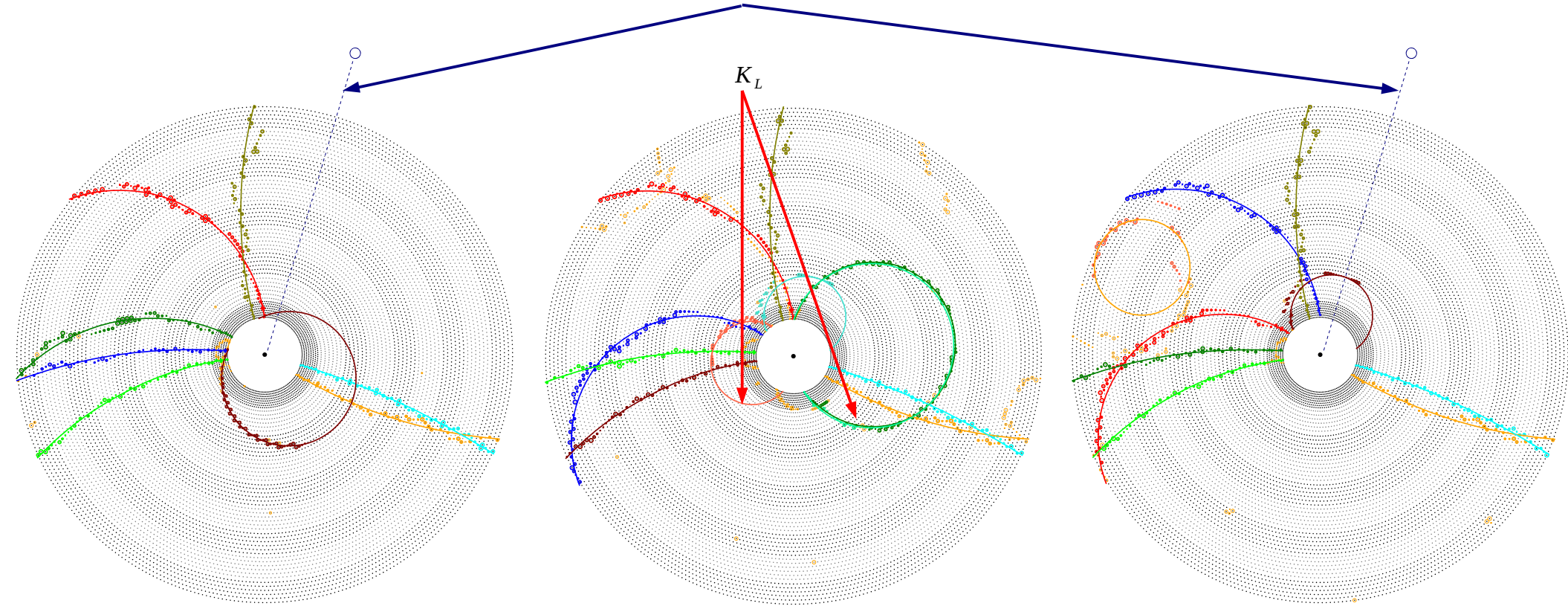
BeamPipe
+PXD+SVD+CDC
+ECL

BeamPipe
+PXD+SVD+CDC
+ECL
+TOP

BeamPipe
+PXD+SVD+CDC
+ECL
+TOP+ARICH

New tracks?

Leaves detector volume



BeamPipe
+PXD+SVD+CDC
+ECL

BeamPipe
+PXD+SVD+CDC
+ECL
+TOP

BeamPipe
+PXD+SVD+CDC
+ECL
+TOP+ARICH

Problems with `add_simulation()`

During background studies I found strange behavior of `TrackFinderMCTruth` in case of scaled beam background

`add_simulation()` function:

Default:

```
...
path.add_module('BeamBkgMixer')
path.add_module('Gearbox')
path.add_module('Geometry')
path.add_module('FullSim')
...
```

With **BG scale factor** > 2.0
`TrackFinderMCTruth` can't find (create)
any `TrackCandidates`
(`MCTrackCand` array is empty)

Custom:

```
...
path.add_module('Gearbox')
path.add_module('Geometry')
path.add_module('FullSim')
path.add_module('BeamBkgMixer')
...
```

With **any BG scale factor**
`TrackFinderMCTruth` successfully creates
`TrackCandidates`