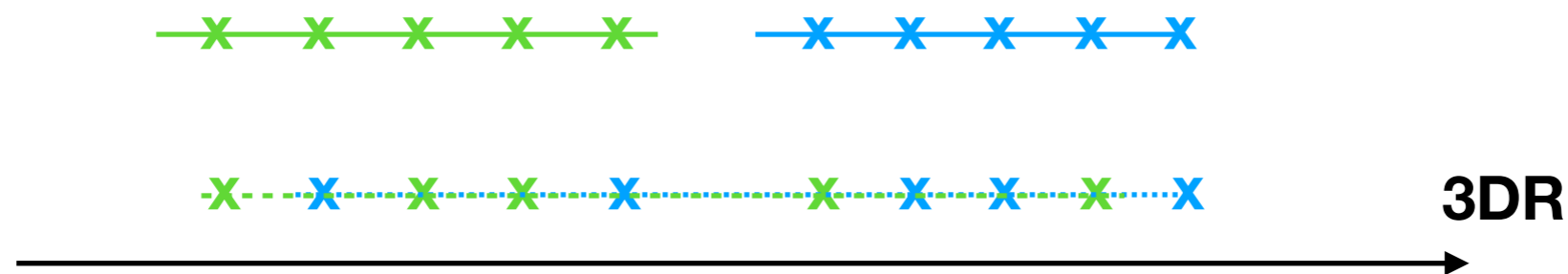


# Clones and split tracks

- ☆ Conformal tracking outputs clones and split tracks
  - ◆ Clones: tracks with two or more overlapping hits
  - ◆ Split tracks: multiple tracks per MC particle



- ☆ `MarlinTrkProcessors: /source/Refitting/src(include)/ClonesAndSplitTracksFinder.cc(.h)`
- ☆ Automatically run after the Conformal Tracking processor

```
<if condition="Config.TrackingConformal">  
  <processor name="MyConformalTrackingFull"/>  
  <processor name="ClonesAndSplitTracksFinder"/>  
</if>
```

# 1. Clones

```
if(n0verlappingHits == trackerHit_a_size){ // if the
  if(b_chi2 < 2*a_chi2){
    bestTrack = track_b;
  }
  else{
    bestTrack = track_a;
  }
}
else if(n0verlappingHits == trackerHit_b_size){ // :
  if(a_chi2 < 2*b_chi2){
    bestTrack = track_a;
  }
  else{
    bestTrack = track_b;
  }
}
else if(trackerHit_b_size == trackerHit_a_size){ //
  if(b_chi2 < a_chi2){
    bestTrack = track_b;
  }
  else{
    bestTrack = track_a;
  }
}
else if(trackerHit_b_size > trackerHit_a_size){ // :
  if(b_chi2 < 2*a_chi2){
    bestTrack = track_b;
  }
  else{
    bestTrack = track_a;
  }
}
else if(trackerHit_b_size < trackerHit_a_size){ // :
  if(a_chi2 < 2*b_chi2){
    bestTrack = track_a;
  }
  else{
    bestTrack = track_b;
  }
}
```

◆ track\_b = track\_a + segment

◆ track\_a = track\_b + segment

◆ same length (n hits)

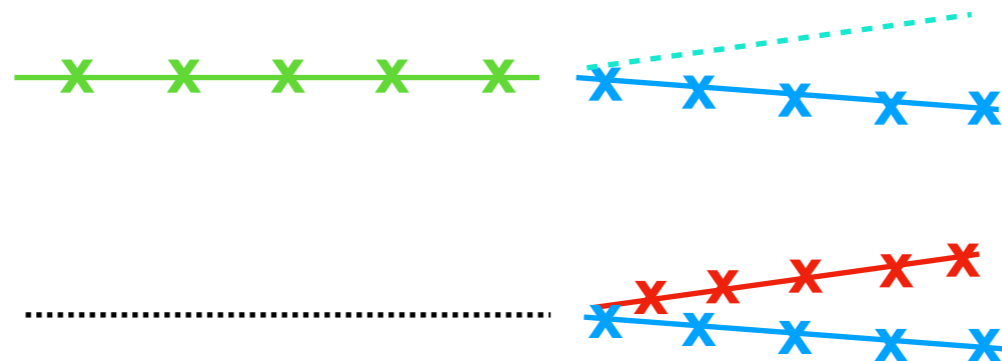
◆ track\_b longer

◆ track\_a longer

## 2. Split tracks (or rather *mergeable tracks*)

- ◆ Once the clones are removed, there can still be tracks sharing 1 hit (max)
- ◆ We look for possible split tracks: if they share a certain  $\Delta\theta$ ,  $\Delta\phi$  region and if their  $p_T$  matches
- ◆  $\Delta\theta = 0.59$  deg,  $\Delta\phi = 0.99$  deg,  $\Delta p_T = 0.69$  GeV (based on the pull distributions for tracks associated to the same MC Particle in  $b\bar{b}$  events)
- ◆ Once the mergeable tracks are found:
  - ◆ if two mergeable tracks: their hits are merged in a new track and refitted and the new track is taken
  - ◆ if more than two mergeable tracks: no merging is performed

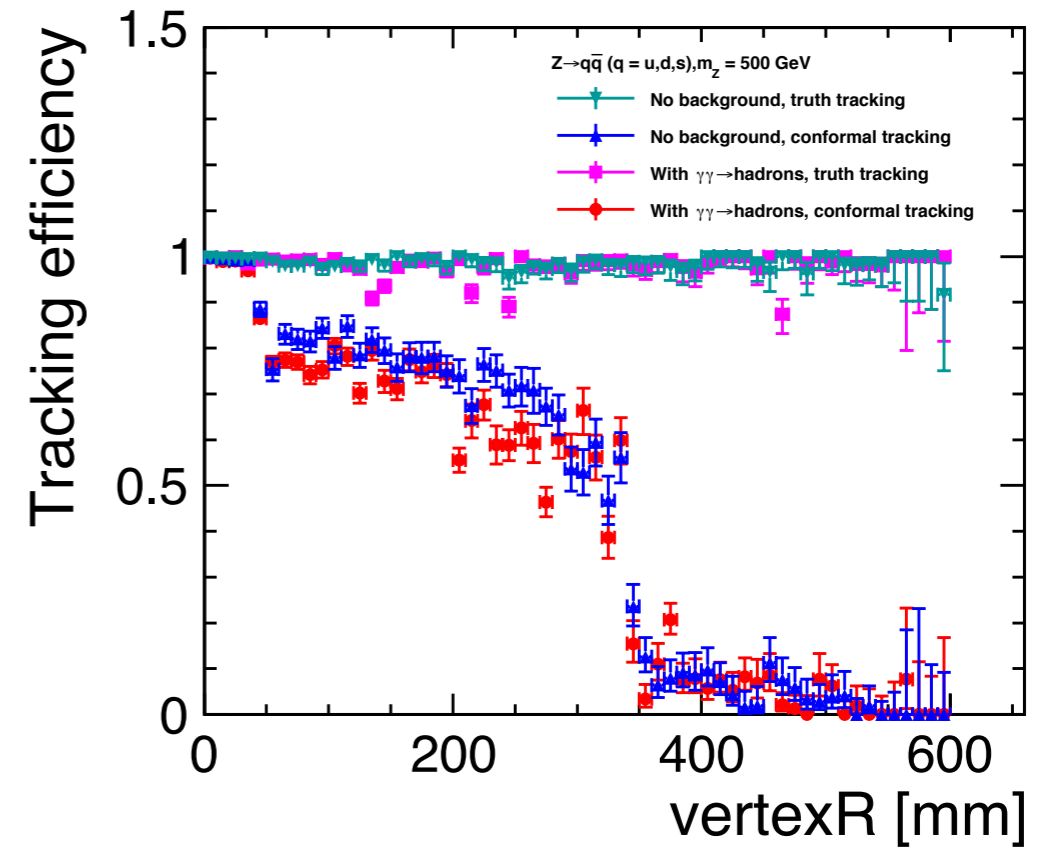
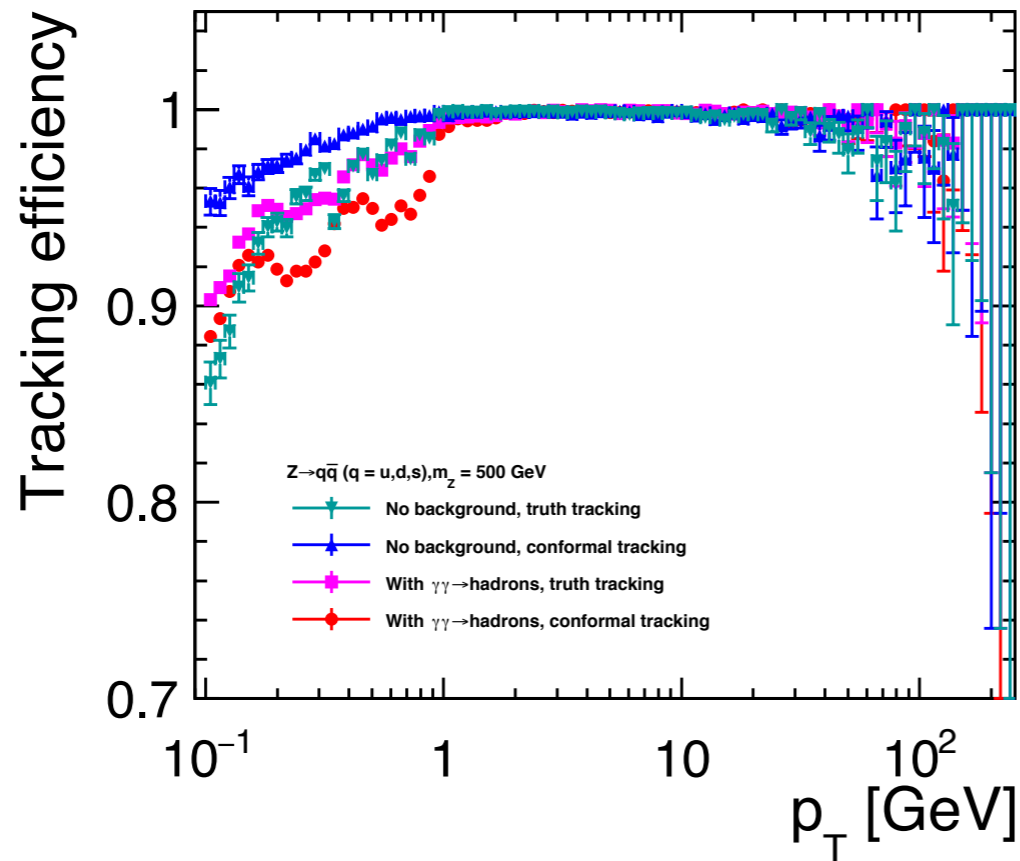
### ☆ Risks of overmerging



# Tracking performances

☆ Zuds@500GeV

old  
release



new  
release

