

# Tracking efficiency and fake rates

Results with iLCSoft\_2017-10-20

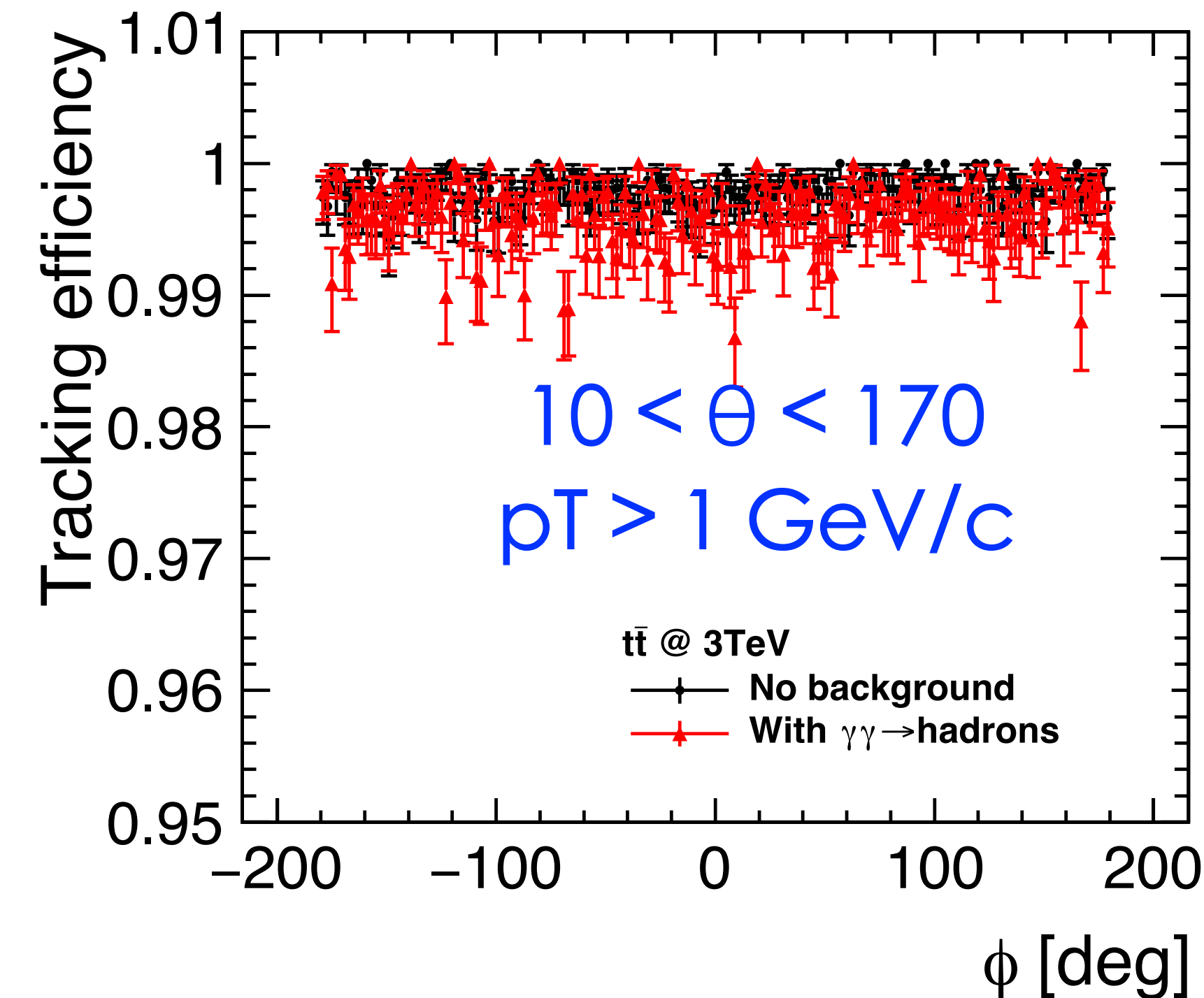
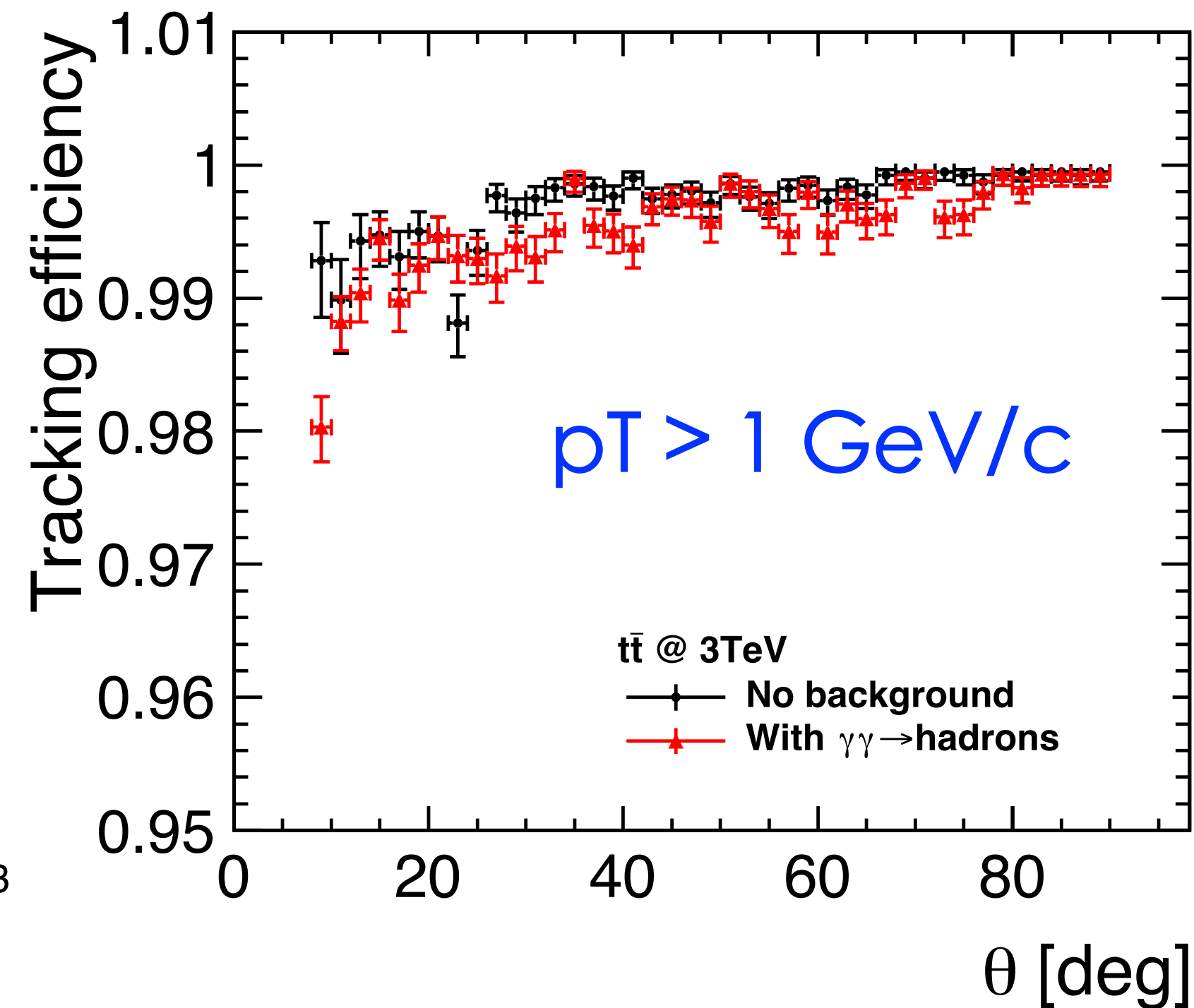
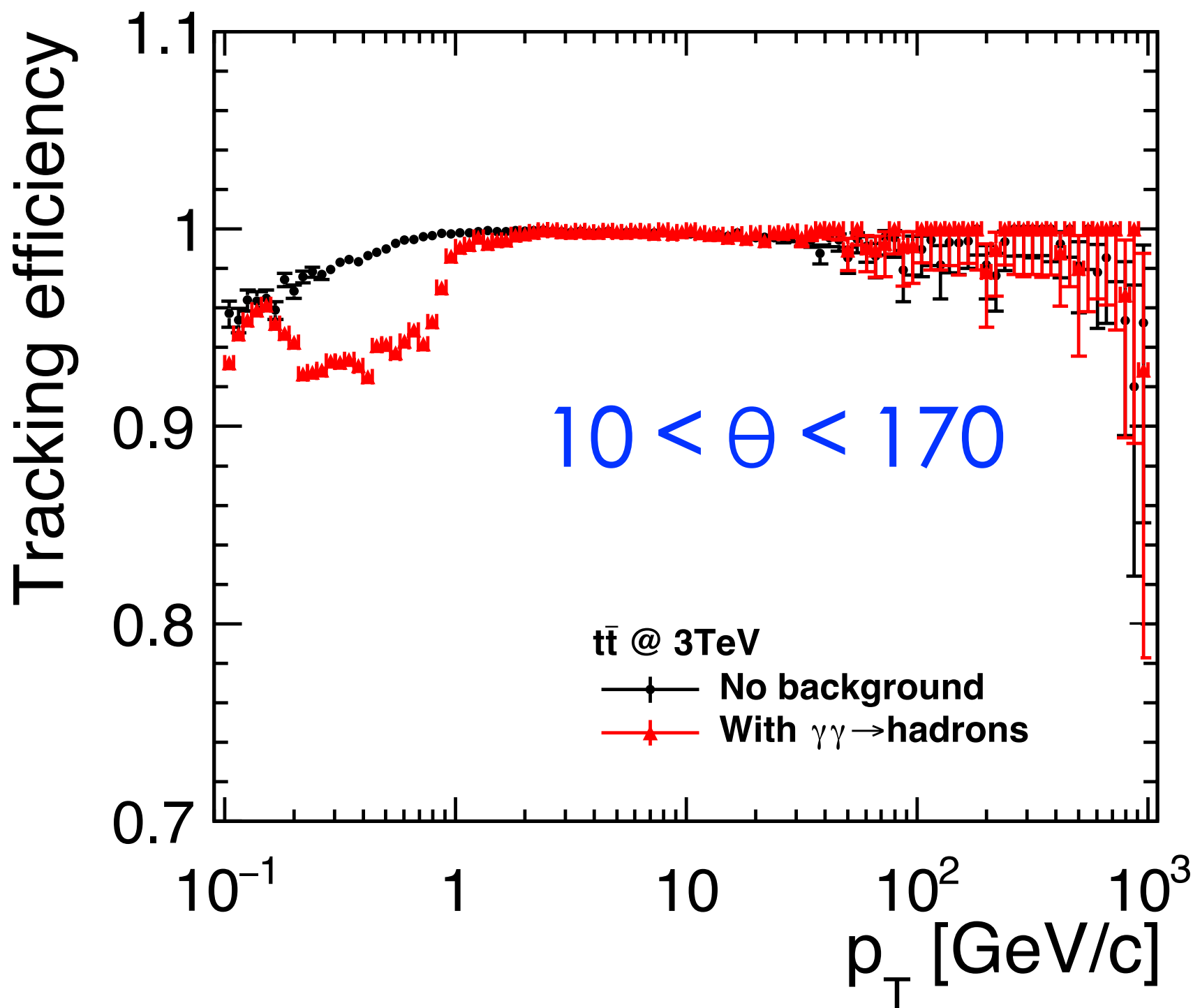
Emilia

Software Meeting - 7/11/2017

- ★  $\text{efficiency} = \# \text{ reconstructed tracks} / \# \text{ reconstructable MC particles}$ 
  - ★ reconstructable MC particles:
    - ★ stable ( $\text{genStatus} = 1$ )
    - ★  $p_T > 100 \text{ MeV}$
    - ★  $|\cos(\theta)| < 0.99$
    - ★ N **unique** hits  $\geq 4$
- ★  $\text{fakes} = \# \text{ badly reconstructed tracks} / \# \text{ reconstructed tracks}$ 
  - ★ badly reconstructed tracks
    - ★ purity  $< 75\%$

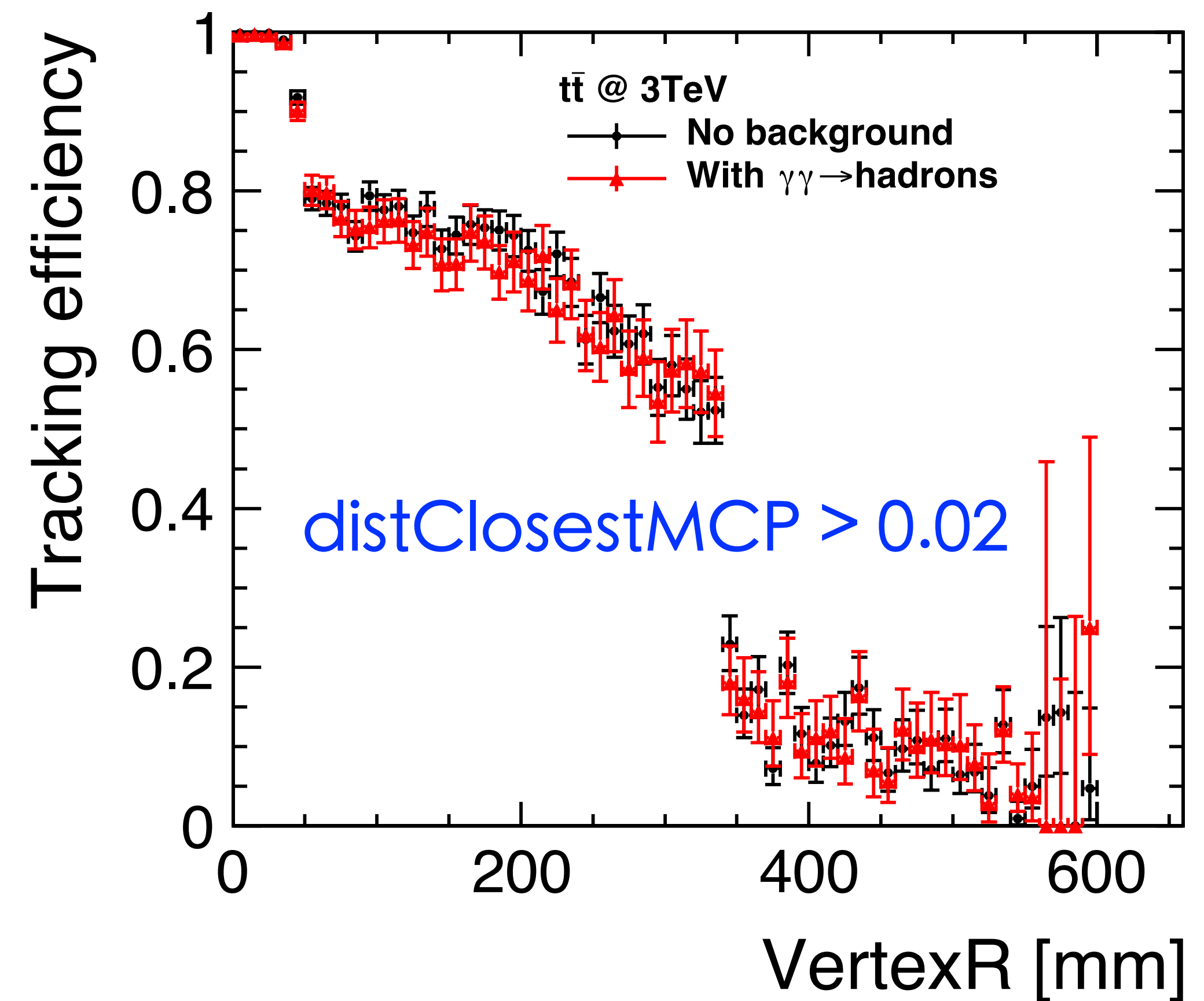
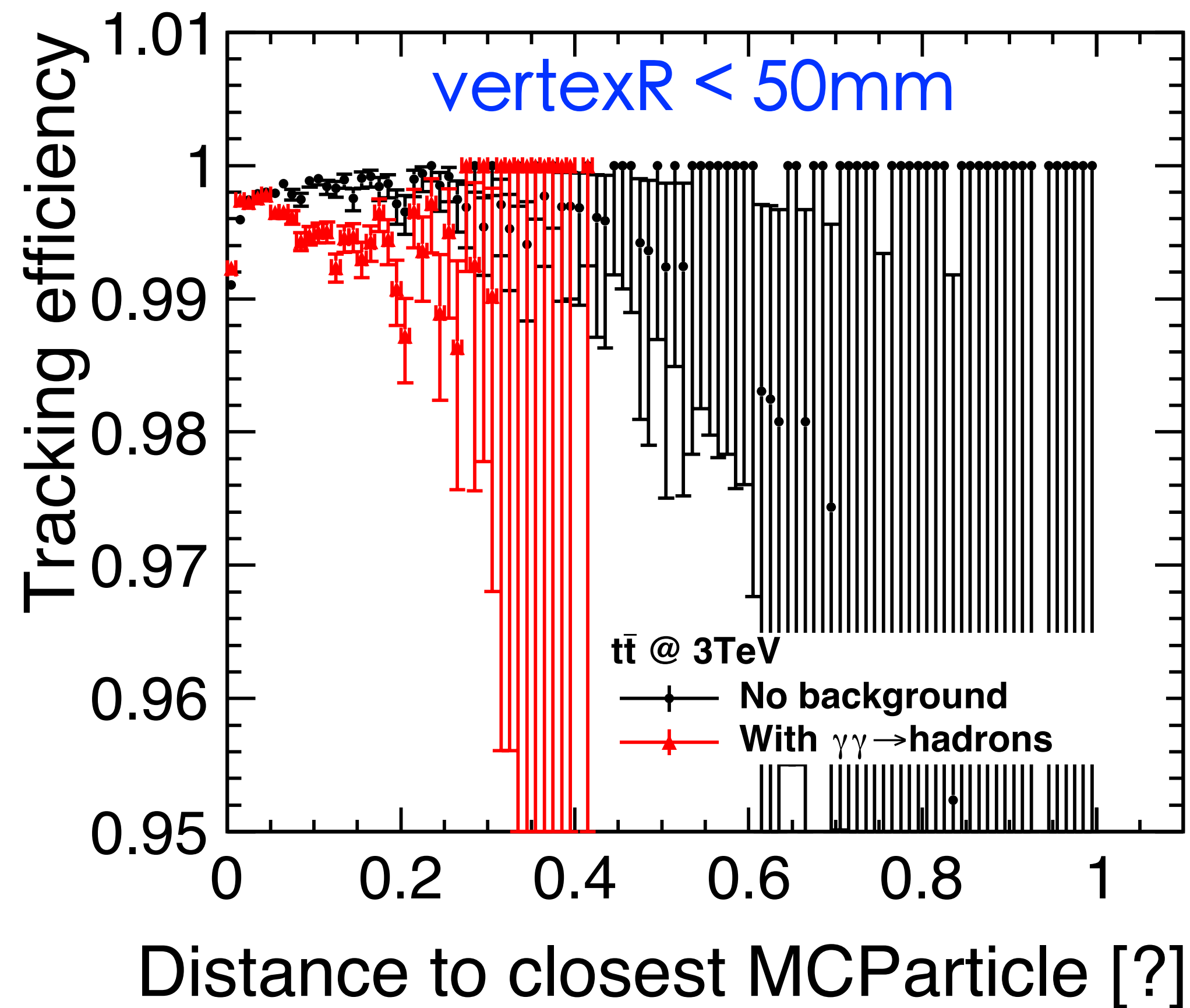
# Tracking efficiency

- ☆  $t\bar{t}$  @ 3TeV
- ☆ w/wo  $\gamma\gamma \rightarrow$  hadrons 30BX overlay
- ☆ common cuts:  $\text{purity} \geq 0.75$  &&  $\text{vertexR} < 50\text{mm}$  &&  $\text{distClosestMCPart} > 0.02$



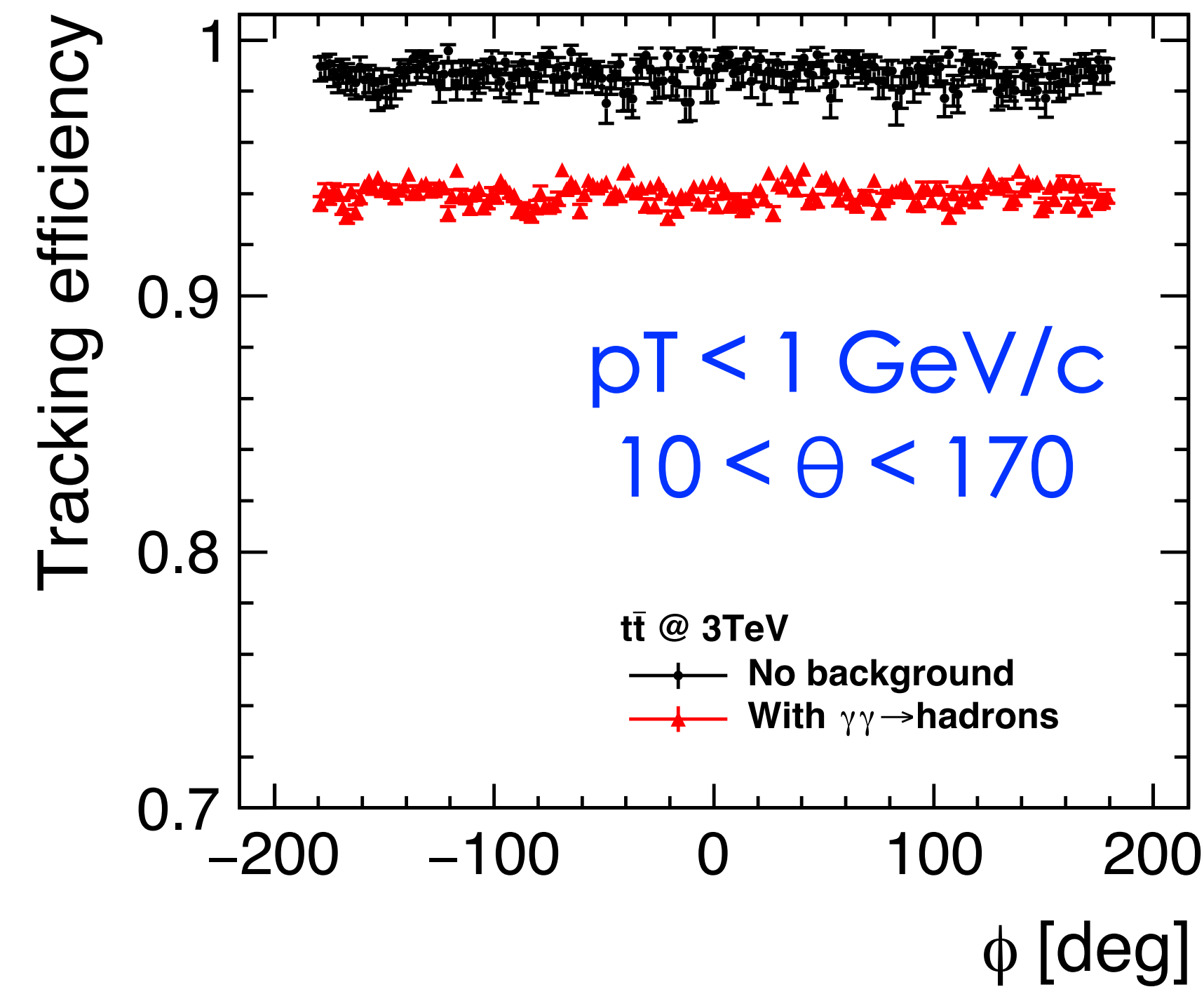
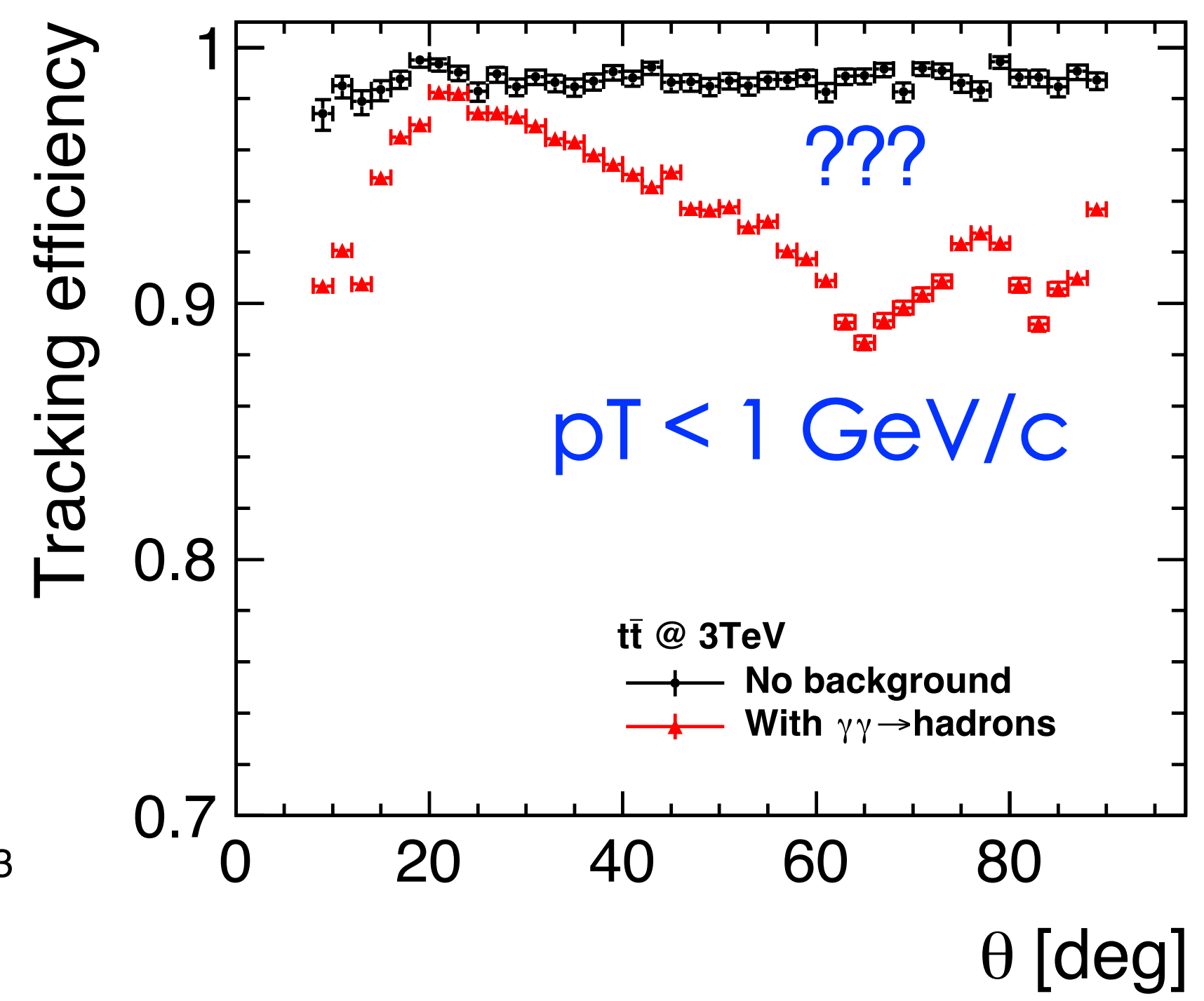
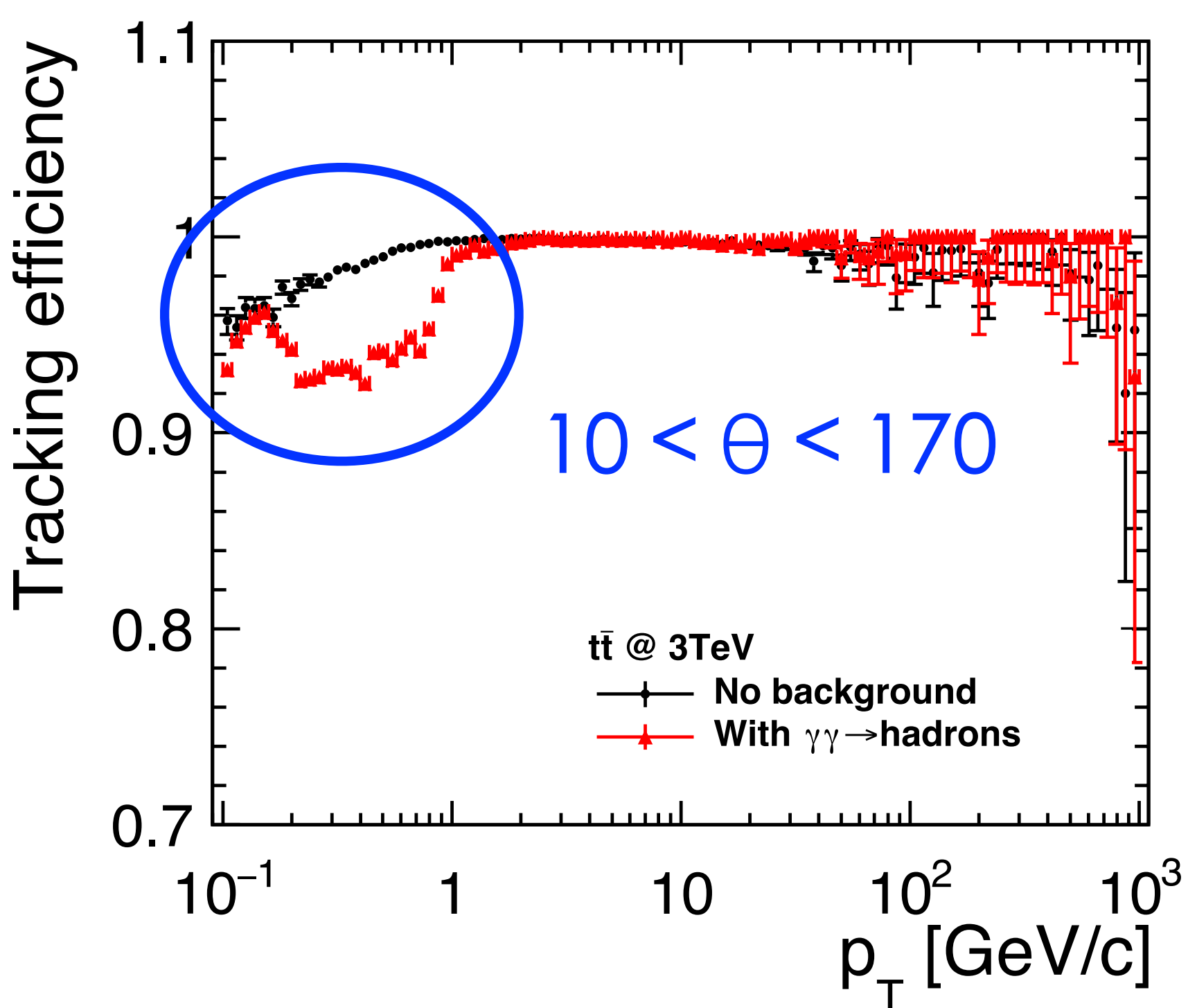
# Tracking efficiency

- ☆  $t\bar{t}$  @ 3TeV
- ☆ w/wo  $\gamma\gamma \rightarrow \text{hadrons}$  30BX overlay
- ☆ common cuts:  $\text{purity} \geq 0.75$  &&  $p_T > 1 \text{ GeV}/c$  &&  $10 < \theta < 170$



# Tracking efficiency at low pt

- ☆ ttbar @ 3TeV
- ☆ w/wo  $\gamma\gamma \rightarrow$ hadrons 30BX overlay
- ☆ common cuts: purity  $\geq 0.75$  && vertexR  $< 50$ mm && distClosestMCPart  $> 0.02$

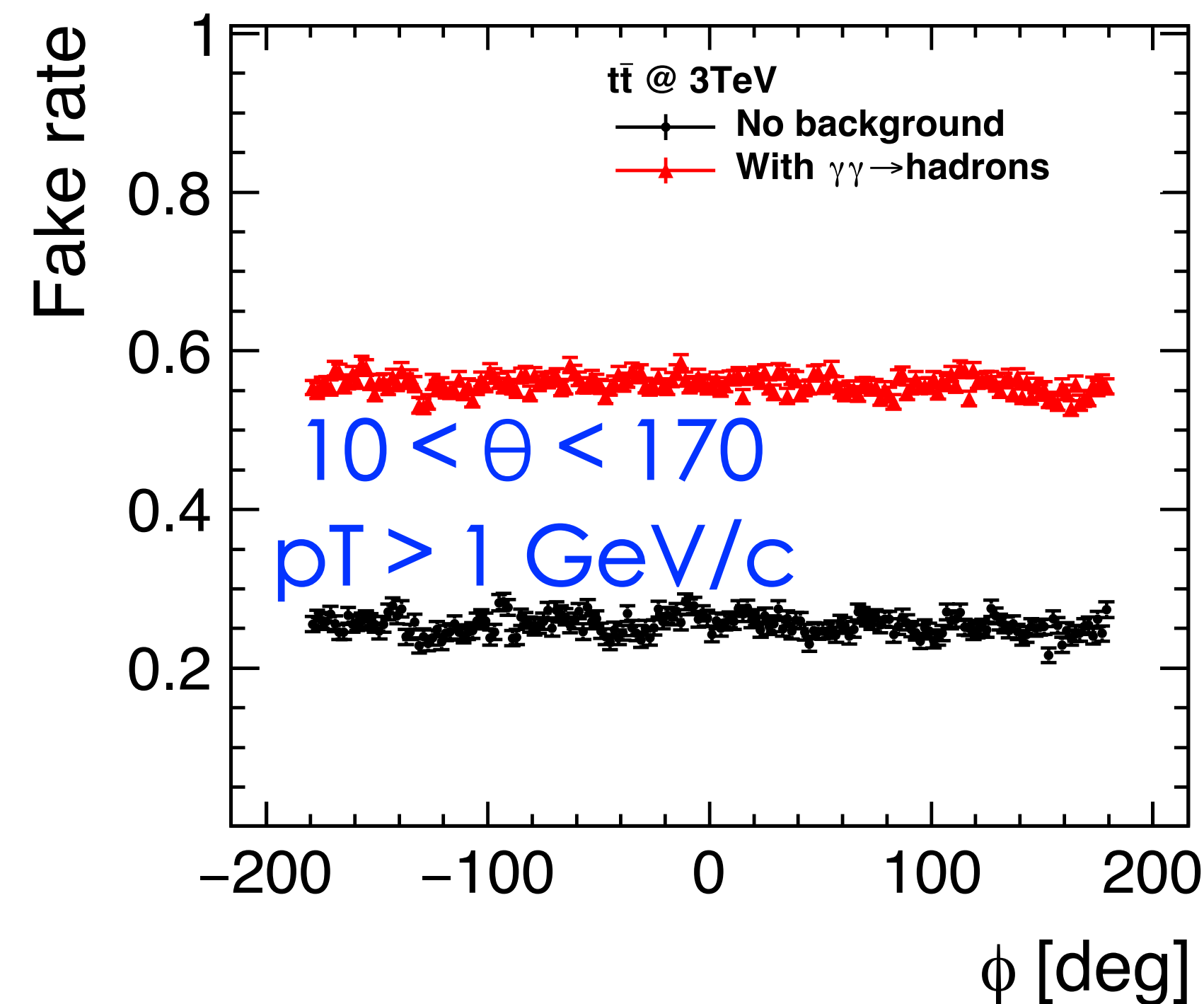
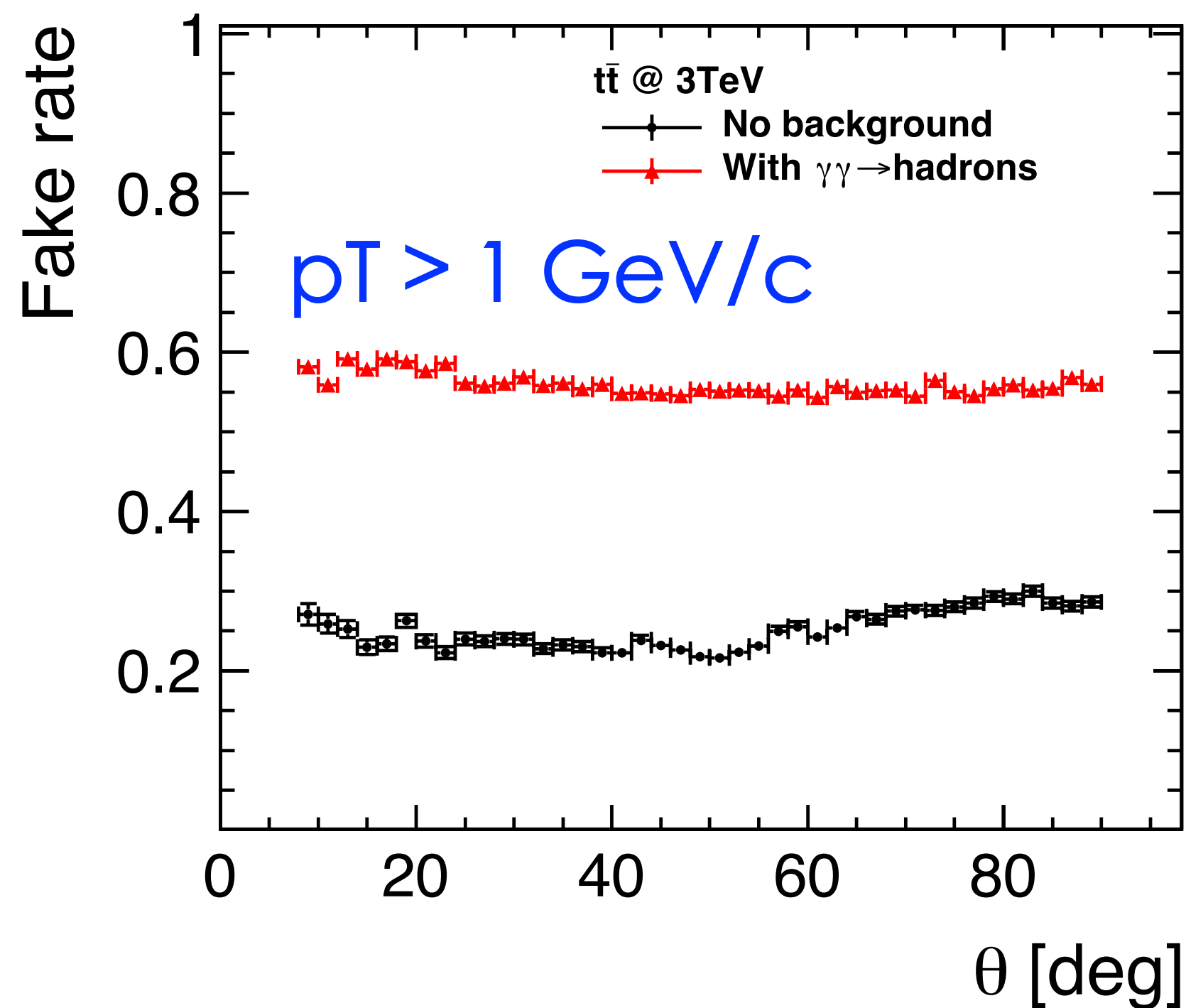
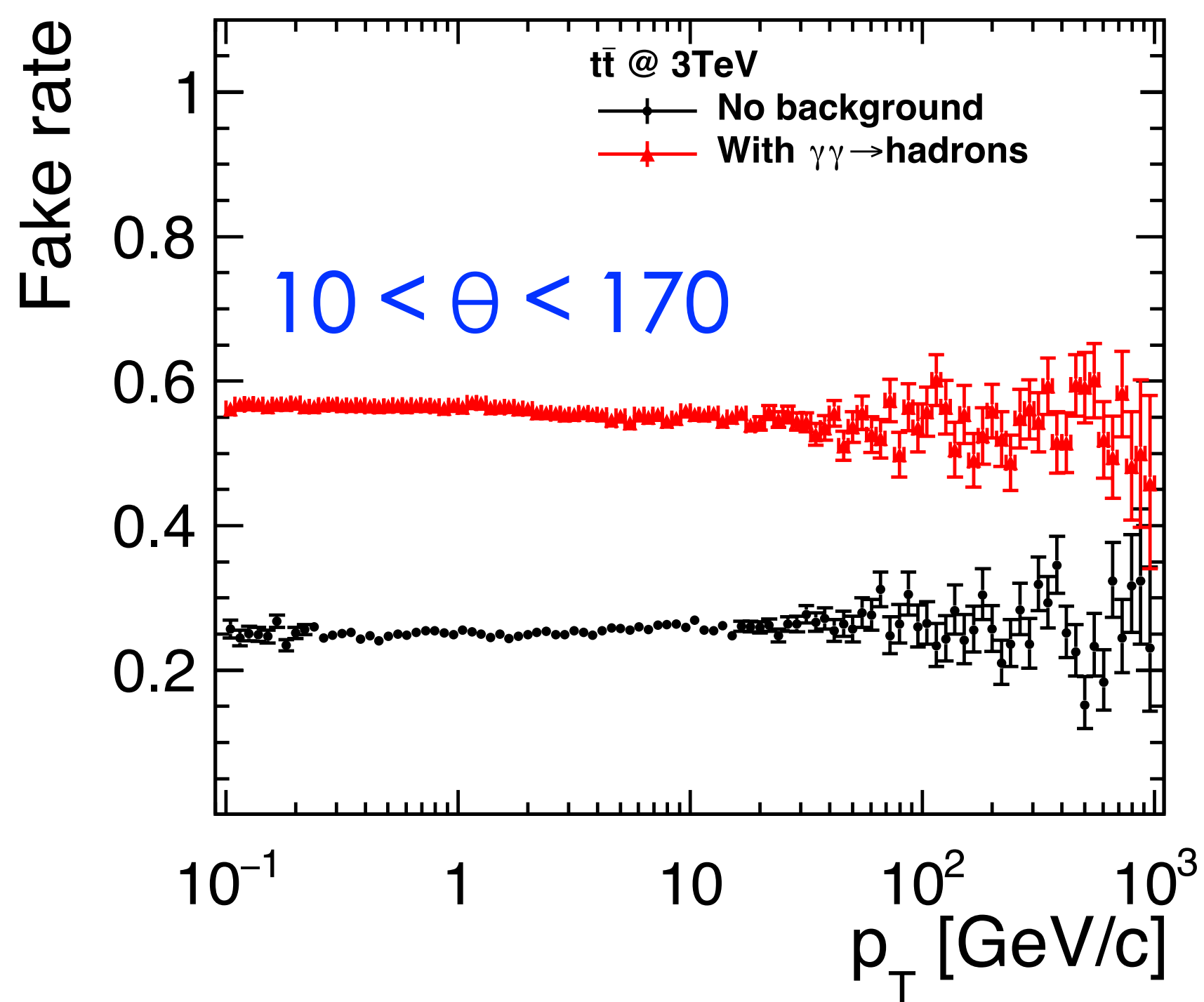


☆ Does not change if we increase the purity

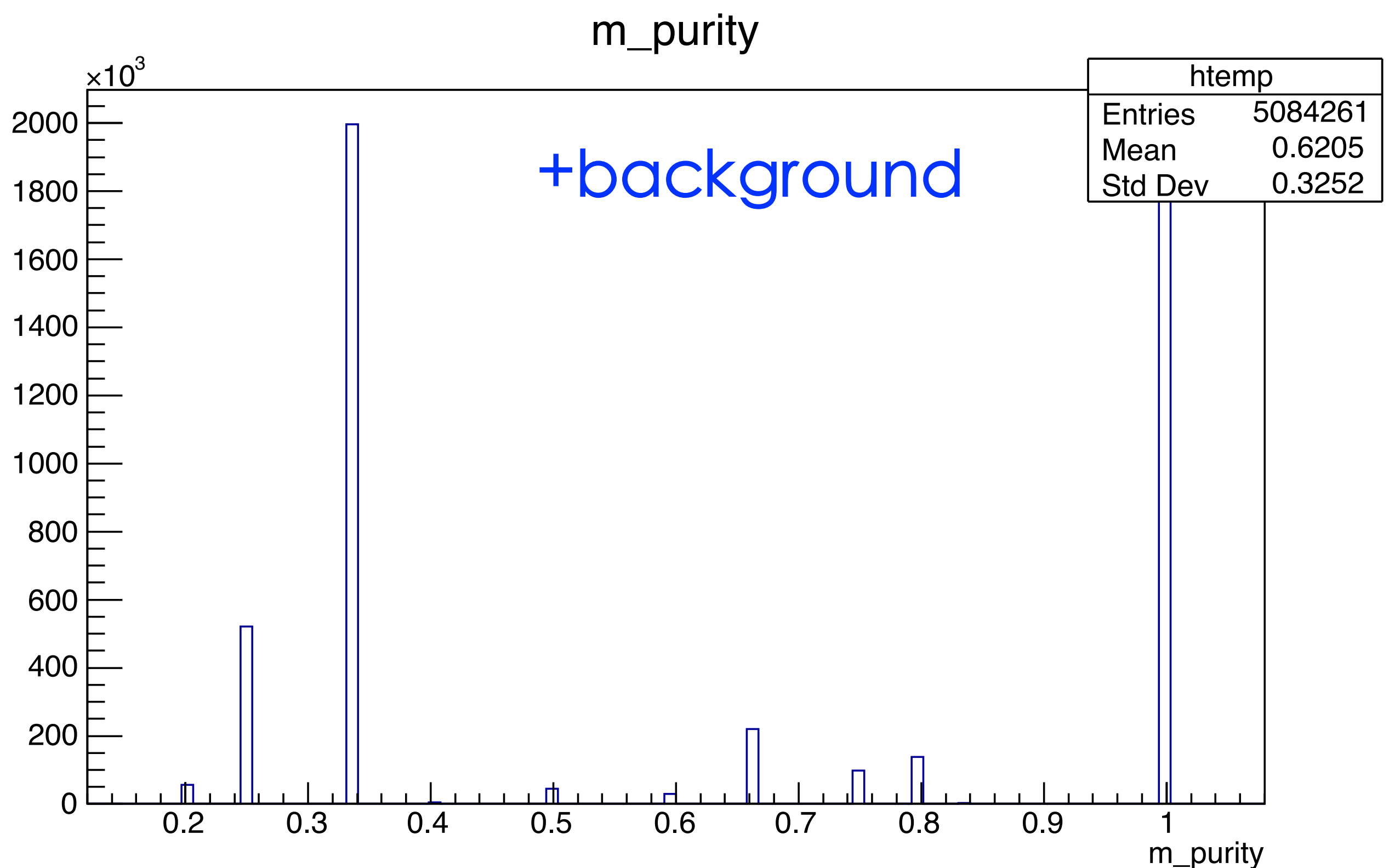
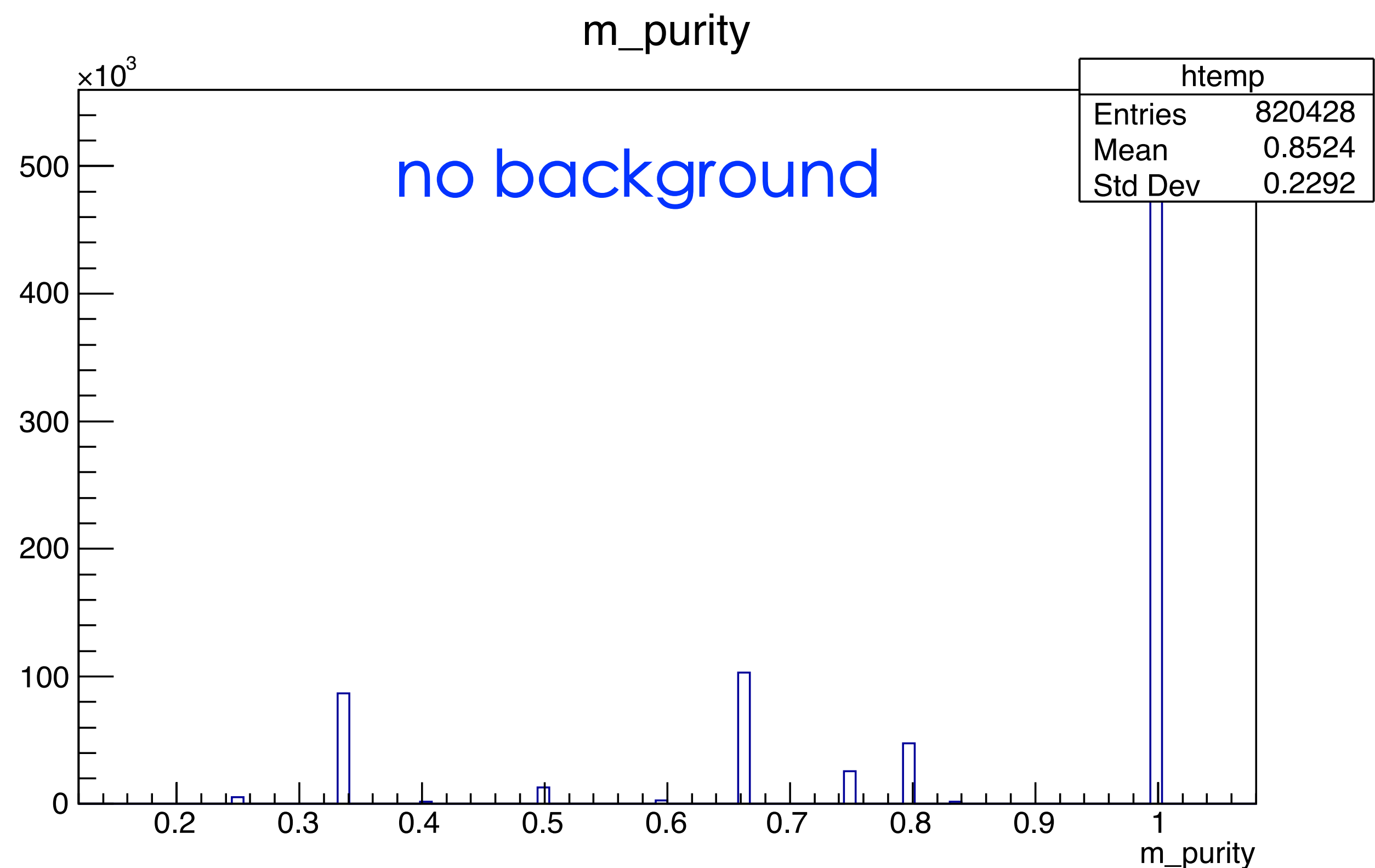
# Fake rate

- ☆  $t\bar{t}$  @ 3TeV
- ☆ w/wo  $\gamma\gamma \rightarrow$  hadrons 30BX overlay
- ☆ common cuts:  $\text{vertexR} < 50\text{mm}$  &  $\text{distClosestMCPart} > 0.02$

NB: not only *MCPhysicsParticles*, but all *MCParticles* are considered

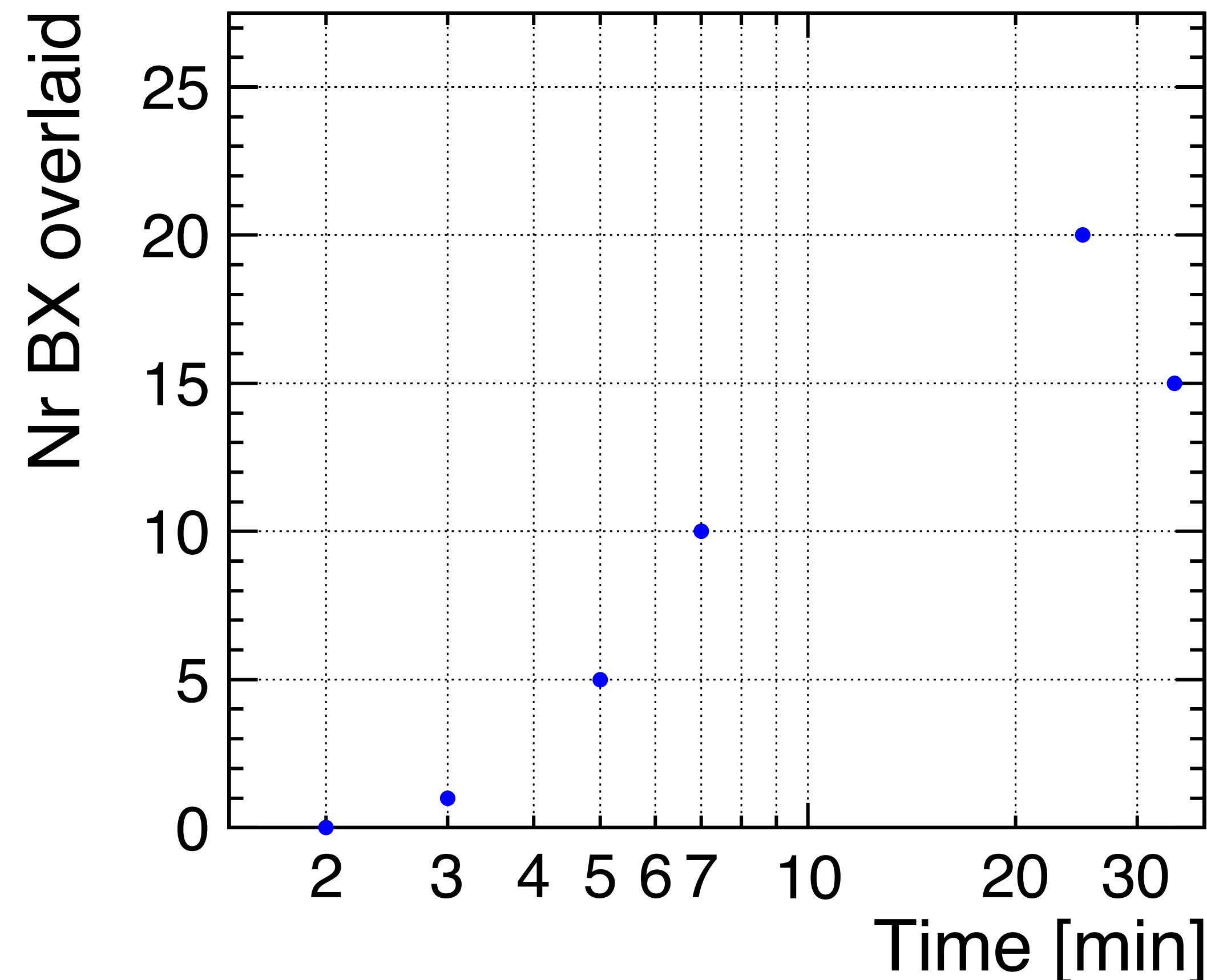


NB: not only MCPhysicsParticles,  
but all MCParticles are considered



# Appendix — Timing of reconstruction of physics + **pairs** background events

- ☆ FCCee det (but it does not matter)
- ☆ 1 physics event (Zuds@91GeV)
- ☆ BX spacing: 20 ns
- ☆ subdetectors integration time: 1000 ns
- ☆ background files available: 50 (1 evt per file)
- ☆ reuse of files has been made optional (flag `m_allowReusingBackgroundFiles`, default = true) but it is highly recommended not to use them more than 2 times



- ☆ When I try to overlay 25 BXs:

```
Mem [||||| 7538/7750MB]
Swp [||||| 4139/7887MB]
```