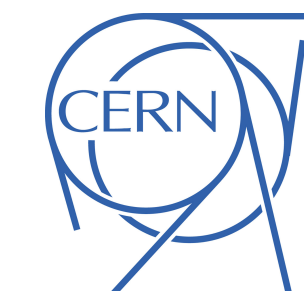


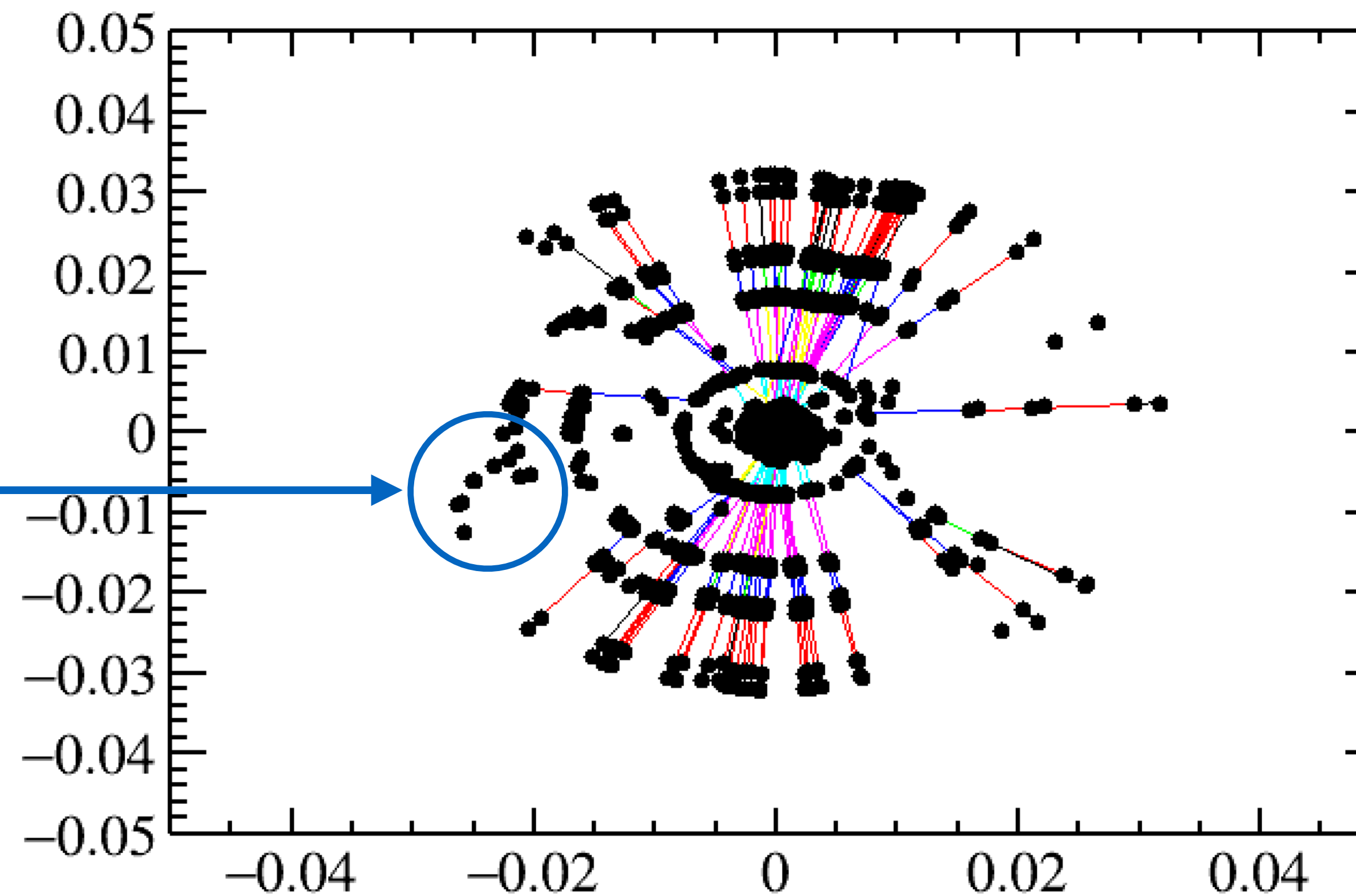
Conformal Tracking - Major update to displaced tracks

Daniel Hynds, Emilia Leogrande

Very brief summary of the issues



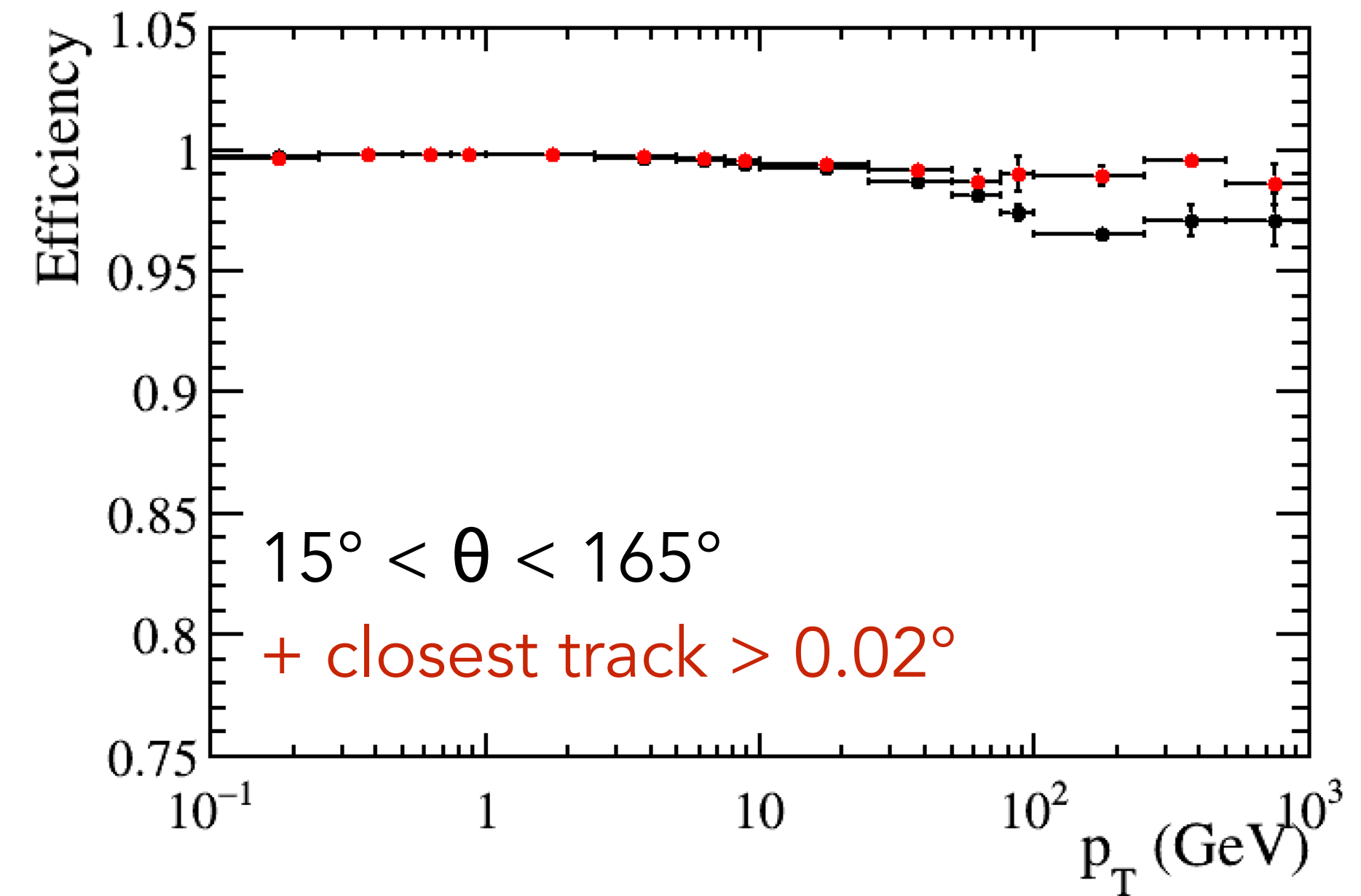
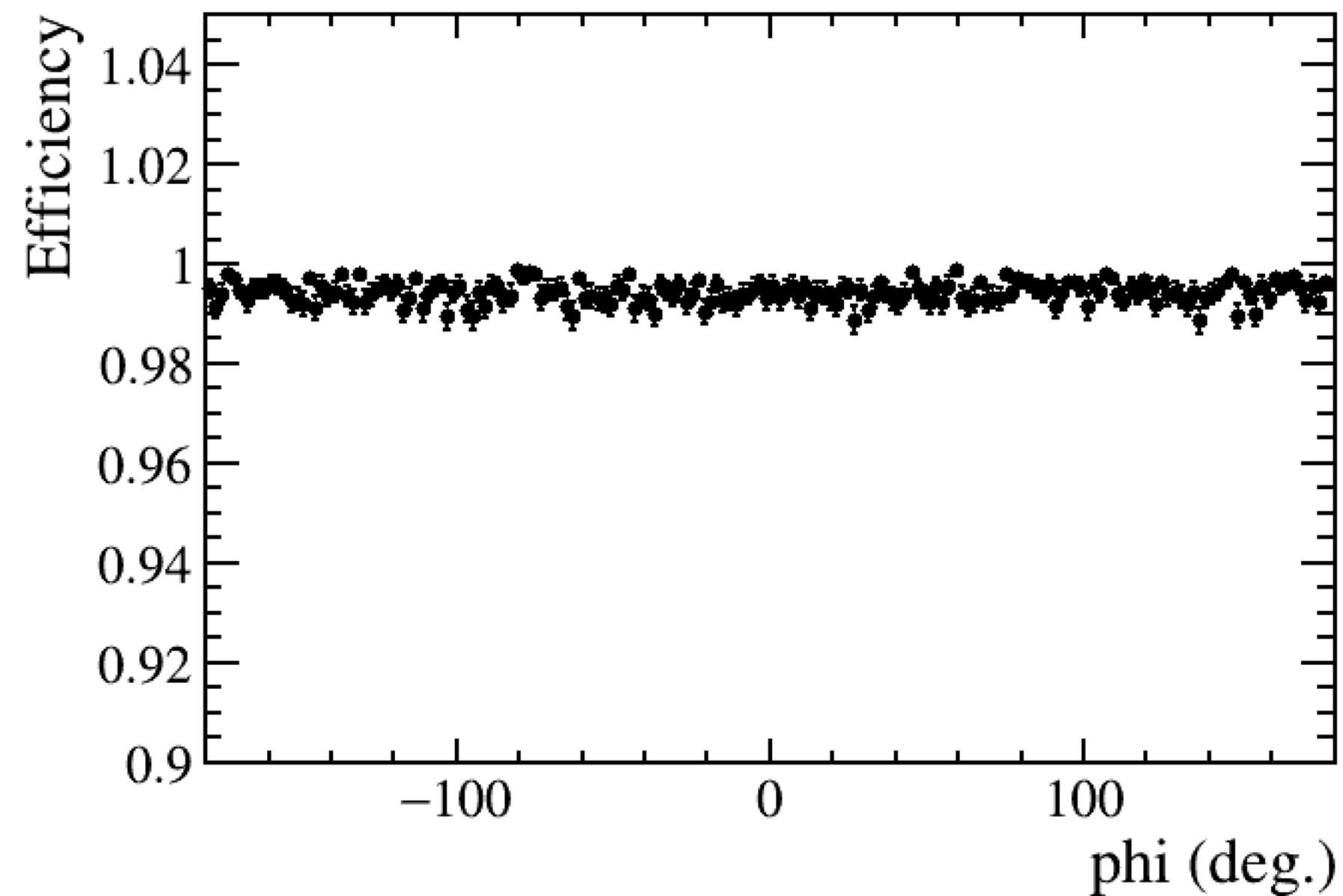
- Two main concerns:
 - Conformal mapping turns circles **through the origin** into straight lines in uv space => secondary terms to include non-zero IP but eventually description (and thus χ^2) breaks down
 - Non-straight lines are no longer covered by CA looking for **cells with angle between them $< \alpha$**
- Additional change:
 - Change reconstruction direction to work backwards from tracker => pick up displaced tracks



Performance - prompt tracks ($r_{\text{vertex}} < 5 \text{ mm}$)



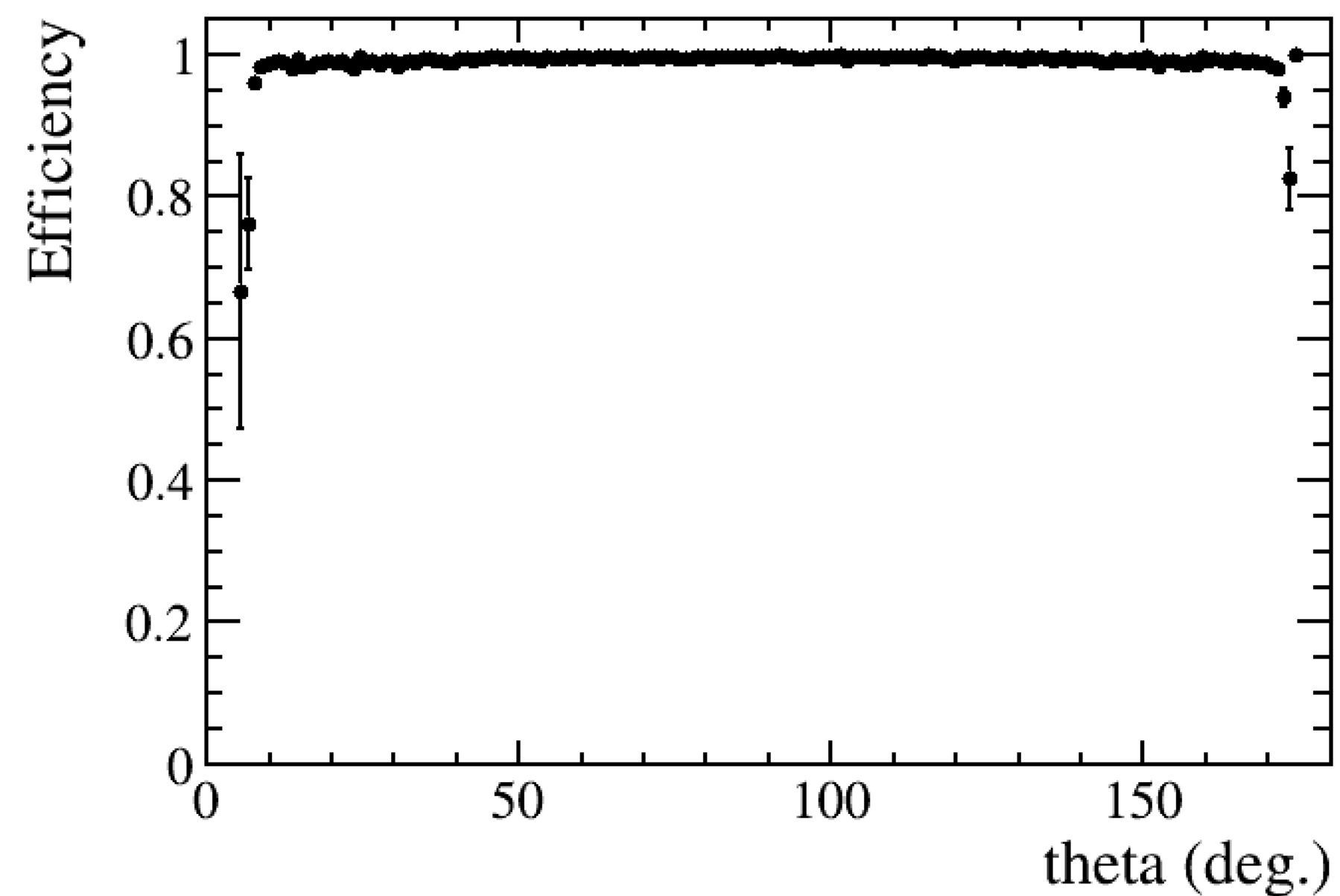
- Running with 3 TeV $t\bar{t}$ events
 - $p_T > 100 \text{ MeV}$ and $\text{radius}_{\text{vertex}} < 5 \text{ mm}$
- Slight dip at high p_T from two high momentum tracks produced with small opening angle



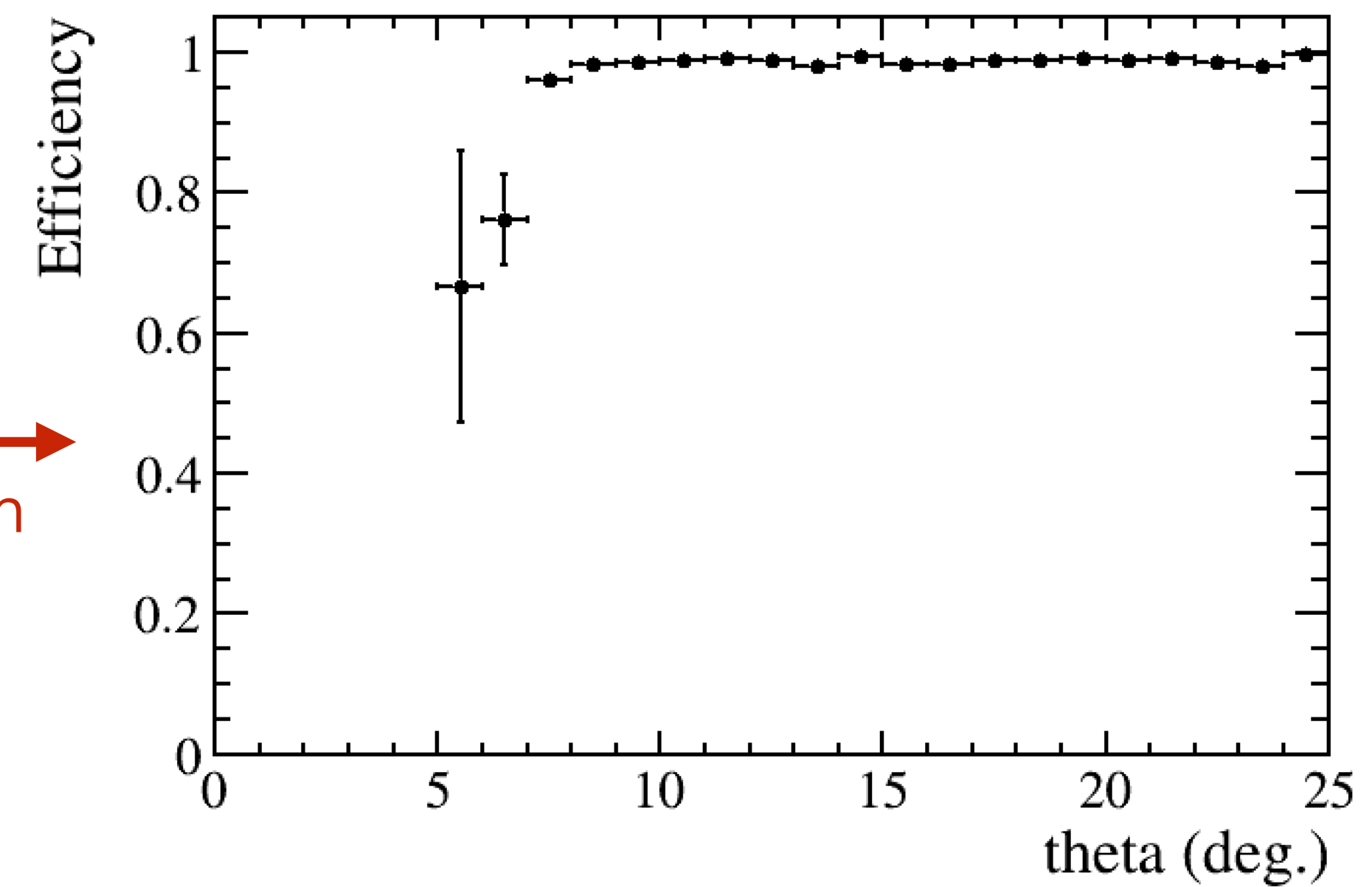
Performance - prompt tracks ($r_{\text{vertex}} < 5 \text{ mm}$)



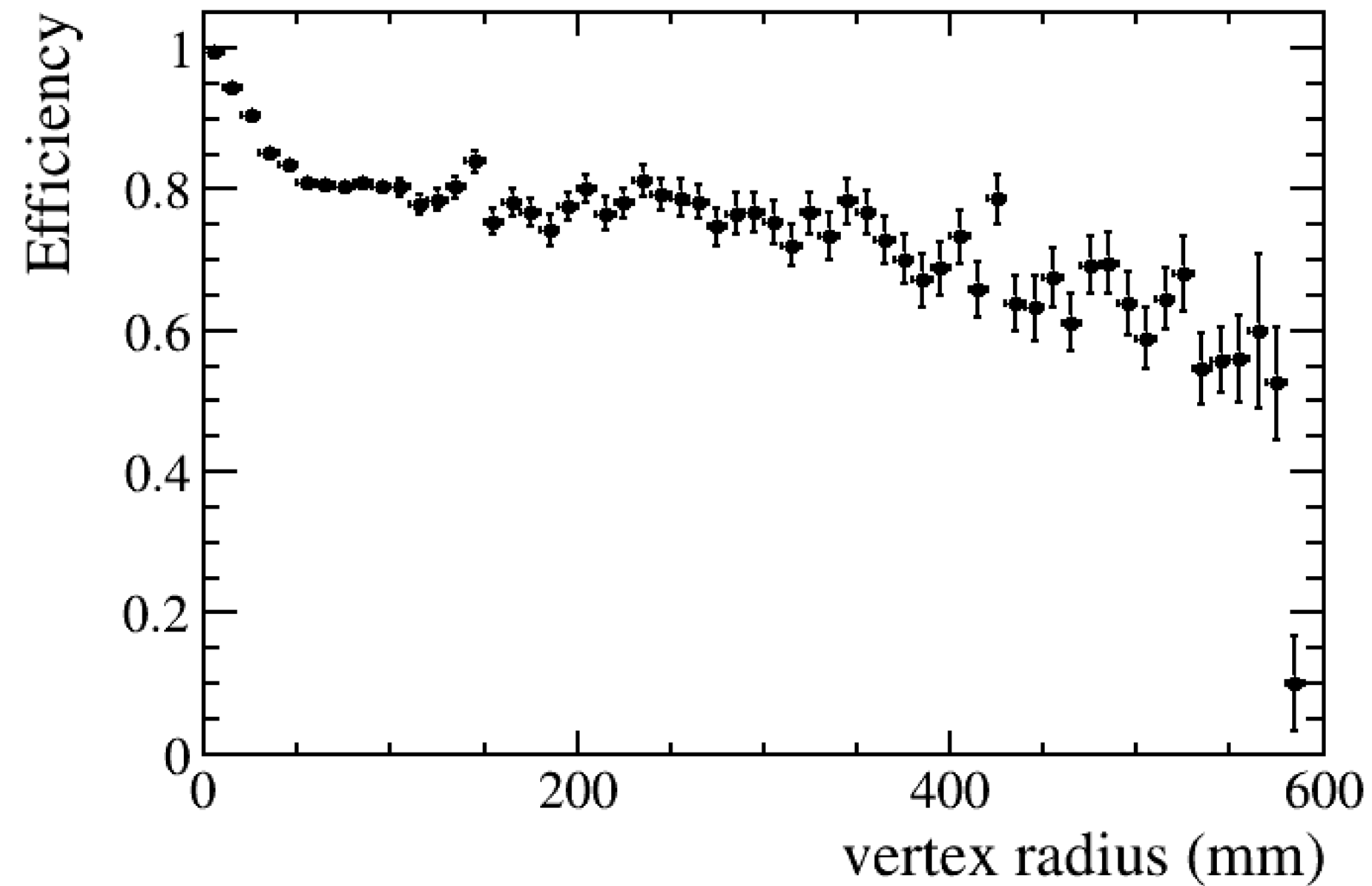
- Running with 3 TeV ttbar events
 - $p_T > 100 \text{ MeV}$ and $\text{radius}_{\text{vertex}} < 5 \text{ mm}$
- Good theta coverage, forward reconstruction stays good to $\sim 7^\circ$



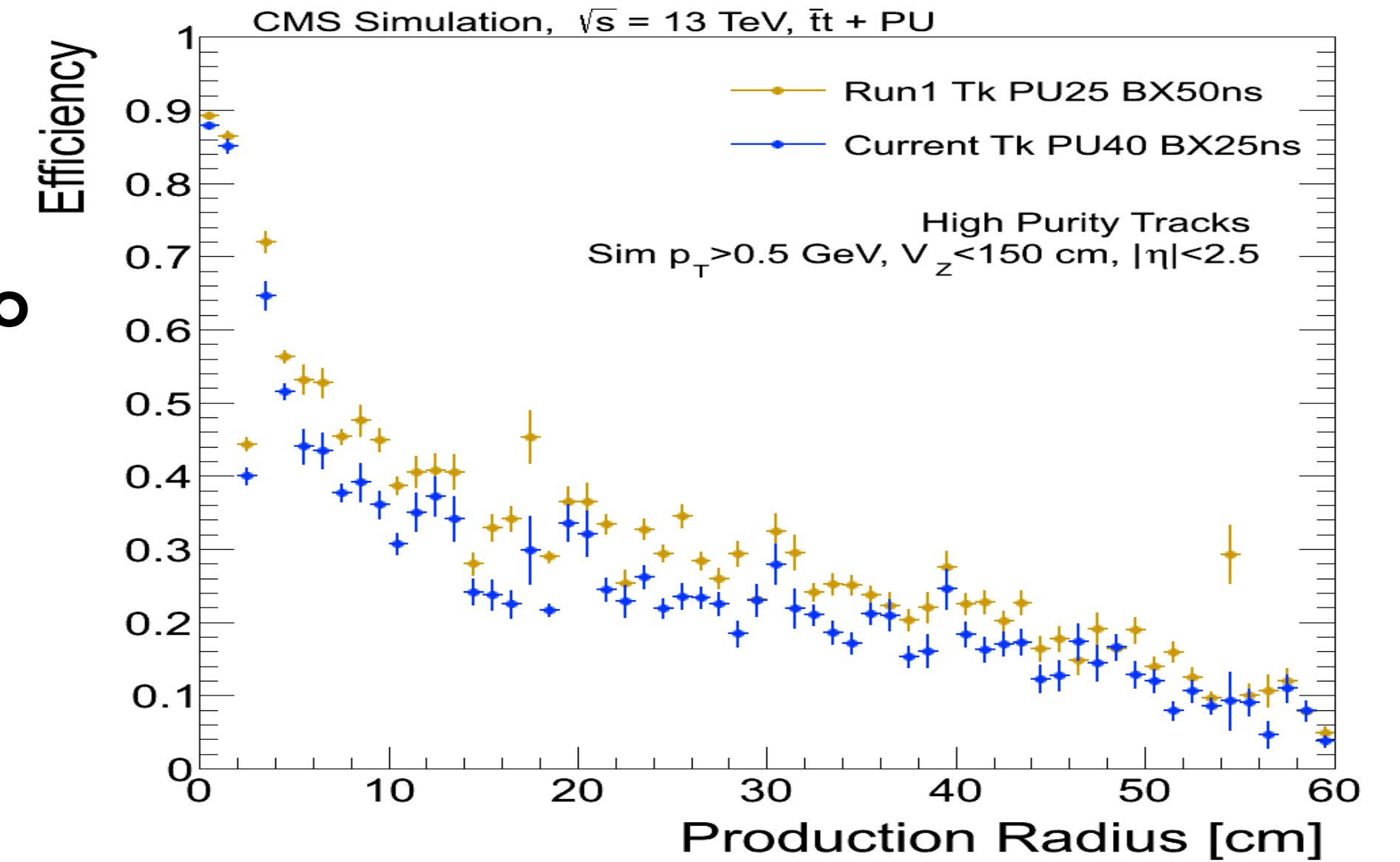
Zoom



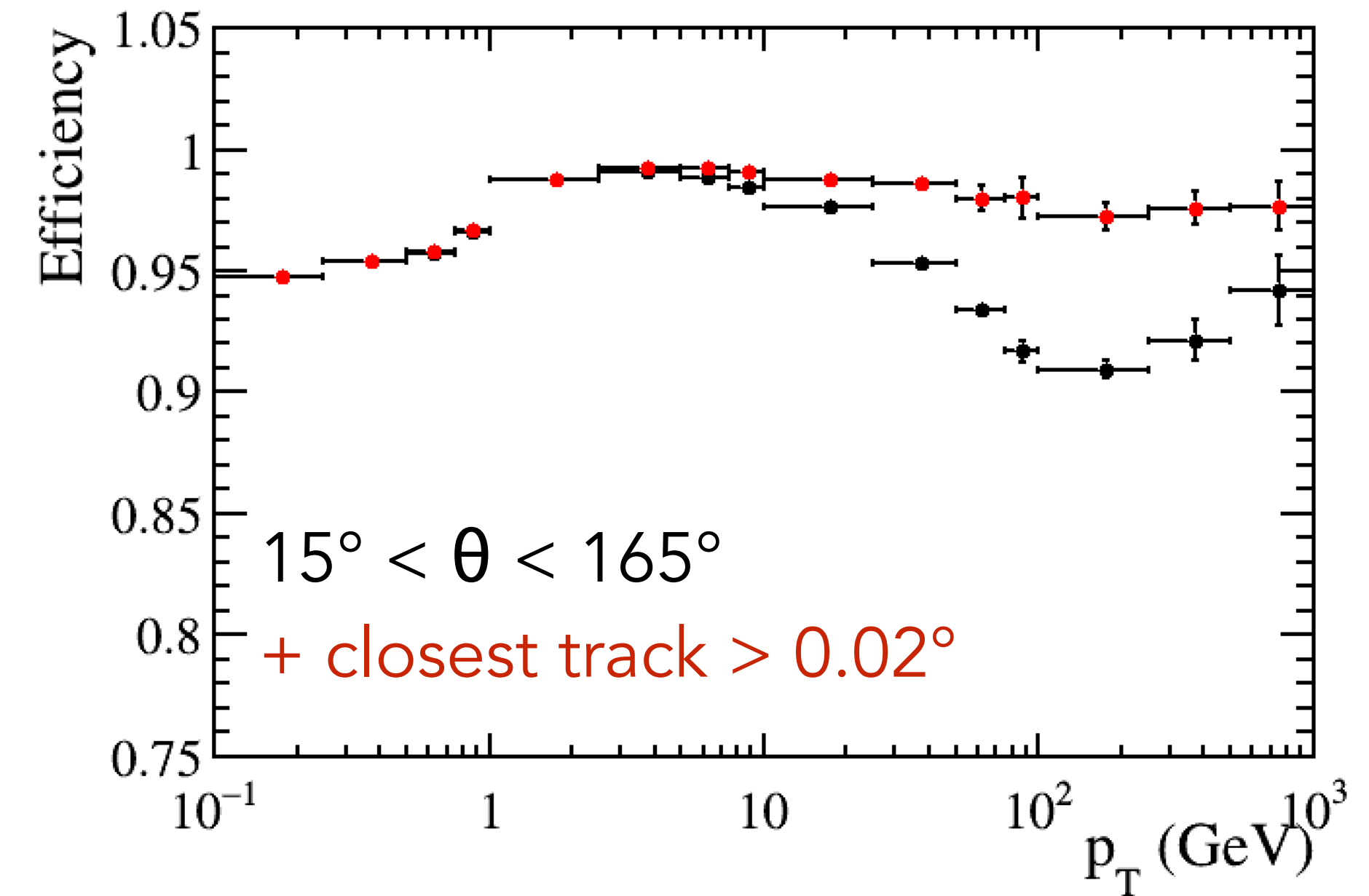
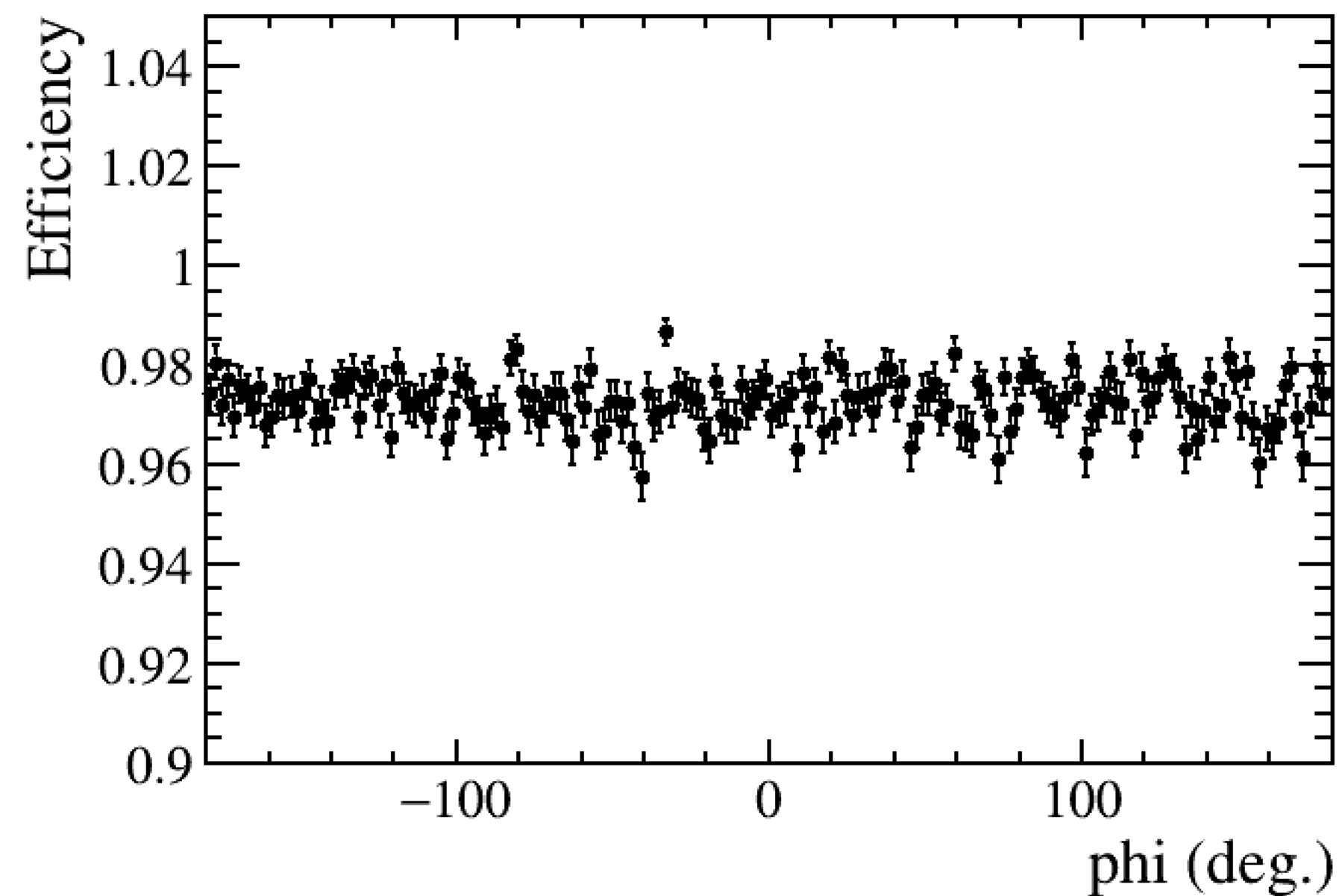
- Running with 3 TeV $t\bar{t}$ events
 - $p_T > 100$ MeV
- Displaced track reconstruction much improved!



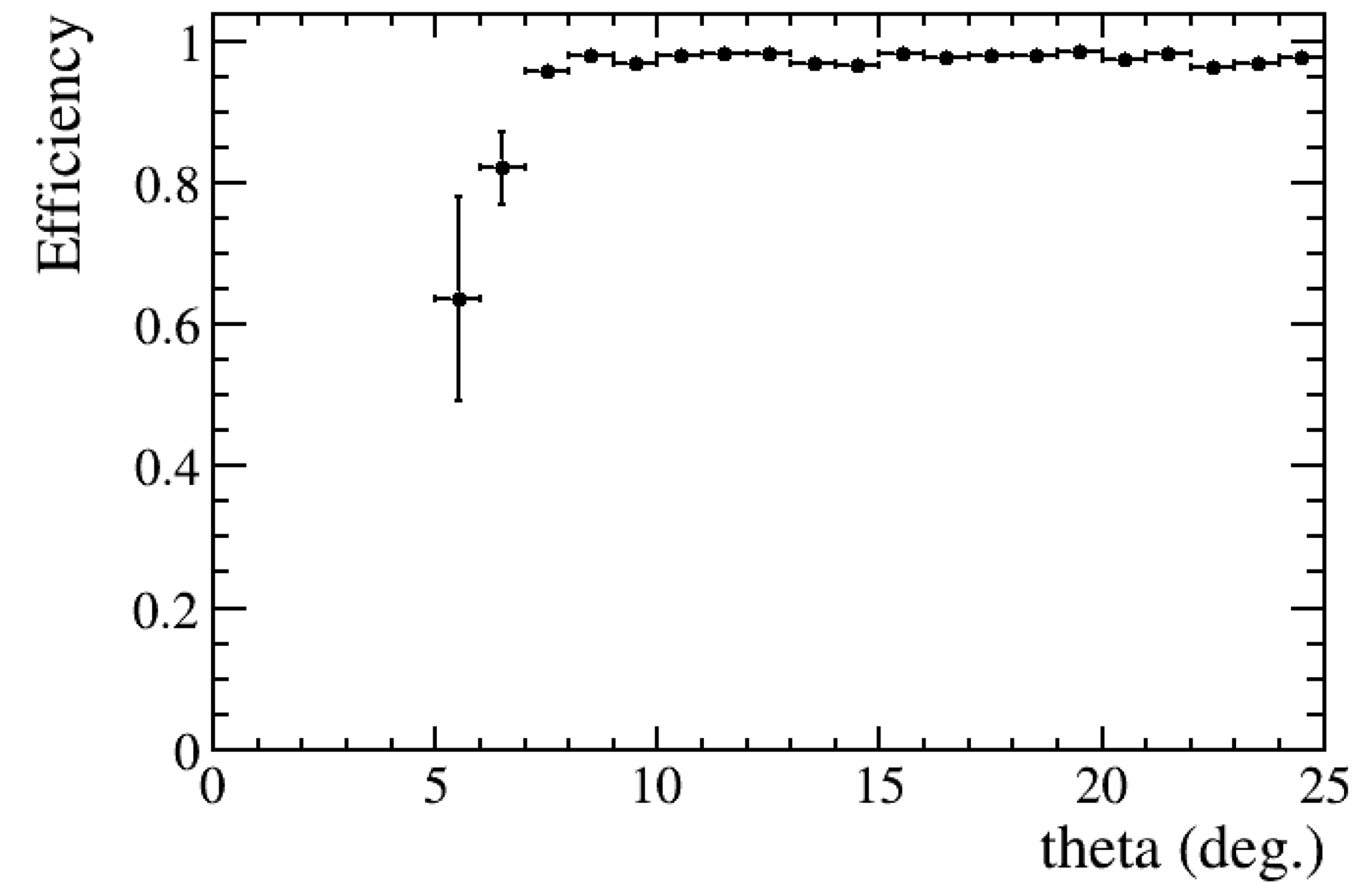
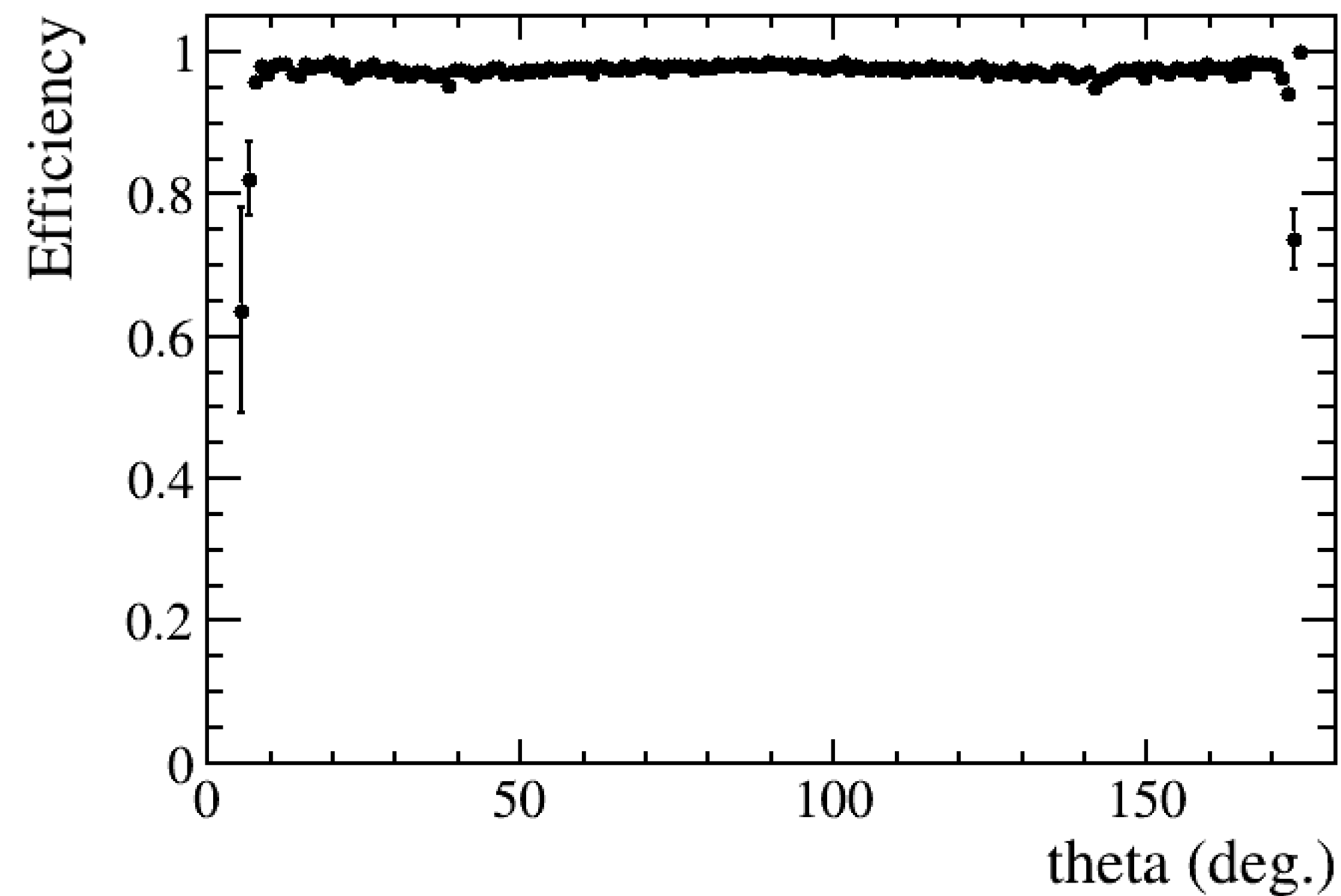
Comparison to current CMS



- Running with 3 TeV ttbar events
 - $p_T > 100$ MeV
- Displaced low momentum tracks more difficult - slight dip compared to prompt



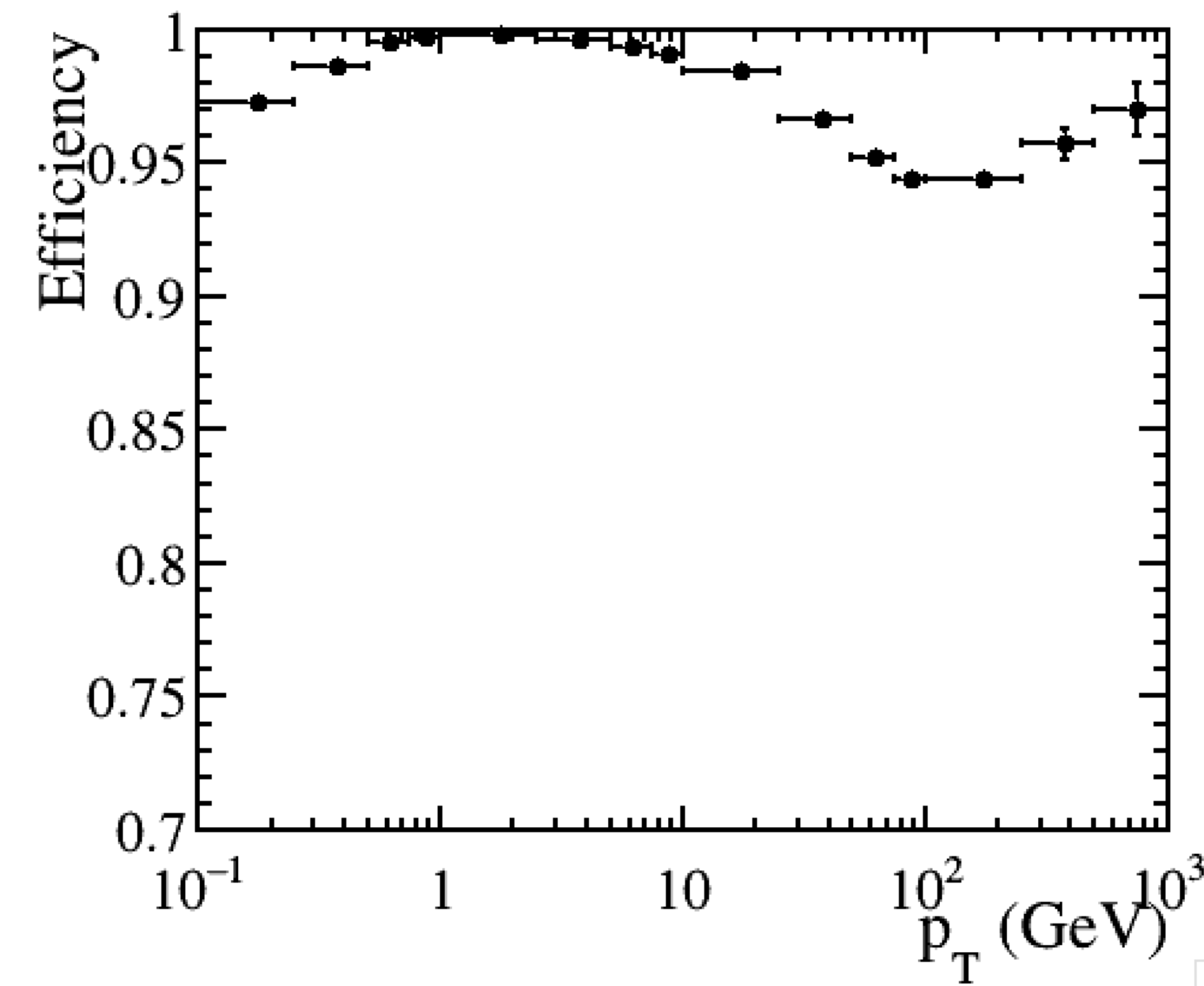
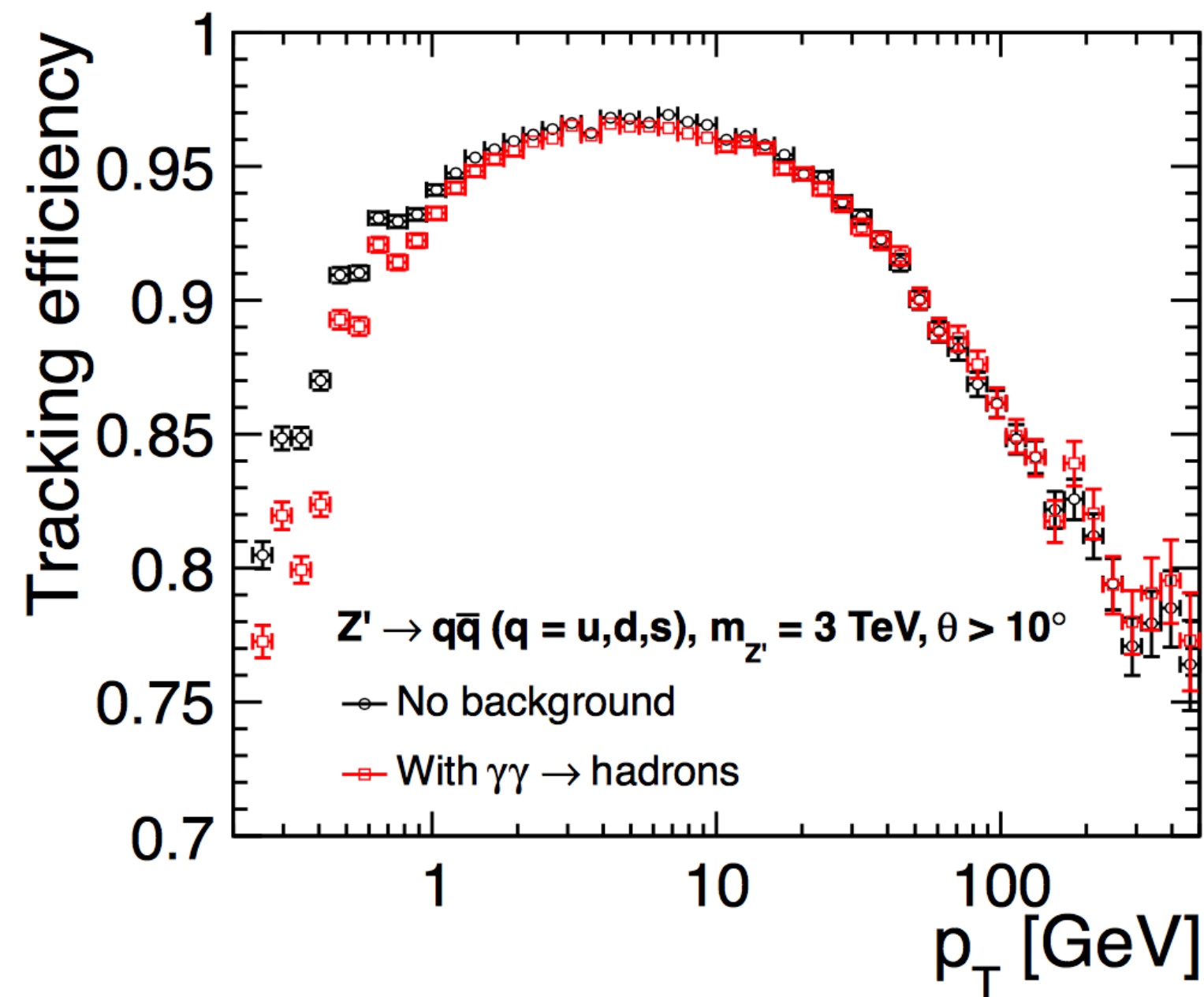
- Running with 3 TeV $t\bar{t}$ events
 - $p_T > 100$ MeV
- Good theta coverage preserved, forward reconstruction stays good to $\sim 7^\circ$



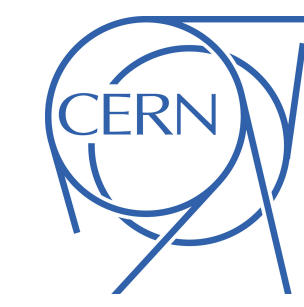
Putting things in context



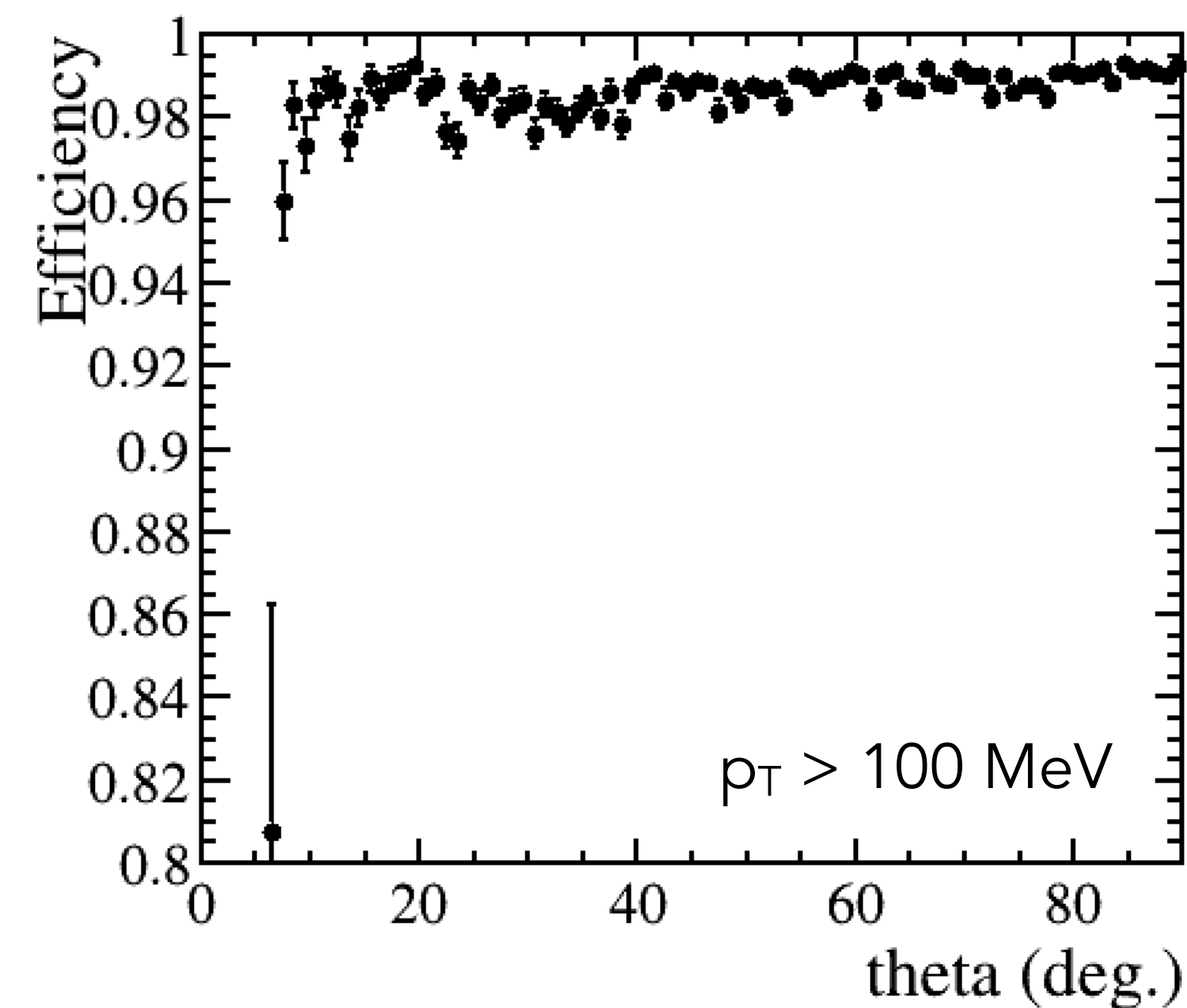
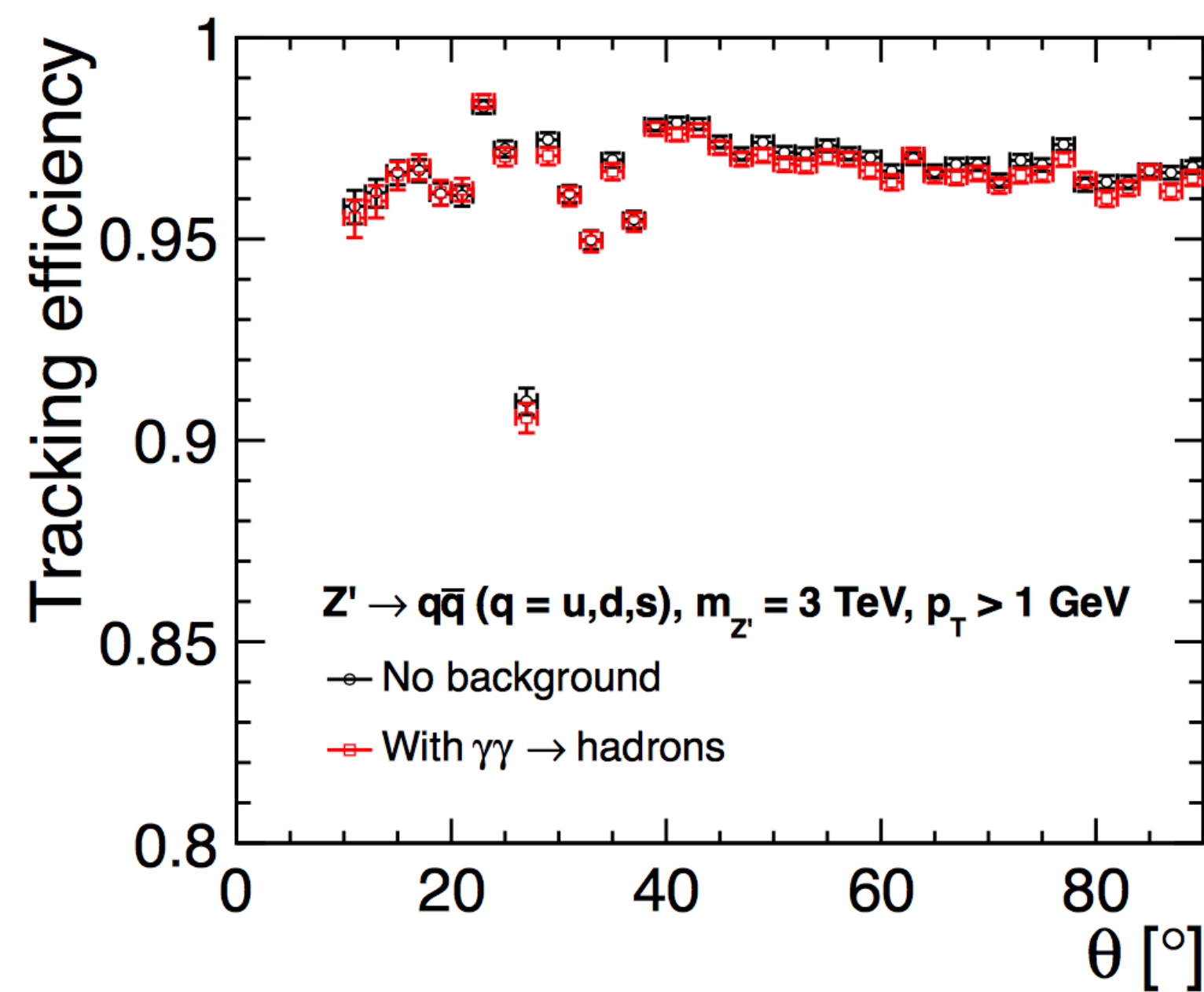
- Compare performance between CDR CLIC_SiD and post-CDR detector
 - CDR used $r_{\text{vertex}} < 50$ mm
 - Difference: **CDR** with 3 TeV $Z' \Rightarrow u,d,s$ - **CLICdet** with 3 TeV $t\bar{t}$



Putting things in context



- Compare performance between CDR CLIC_SiD and post-CDR detector
 - CDR used $r_{\text{vertex}} < 50$ mm
 - Difference: **CDR** with 3 TeV Z' \Rightarrow u, d, s - **CLICdet** with 3 TeV $t\bar{t}$



Things still to be done



- Production over the weekend for more detailed plots (André and Emilia) to compare performance with and without background overlay
 - No doubt still some discussion to be had over how much background is added
- Big remaining question will be clone/ghost/fake rate
 - Tackling this *should* not be a big issue, though plots for LCWS might not be possible, sometimes long turnaround time to test new algorithms/parameter scans
 - LCIO track fit χ^2 should be useful, among other things
- Number of hits not being picked up on tracks should be investigated - broadly speaking plots look good, but momentum and IP resolution plots should be the guide to how well we are doing
- Timing could be improved for displaced track reconstruction step - not a major issue