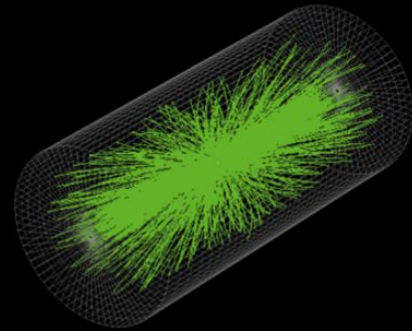
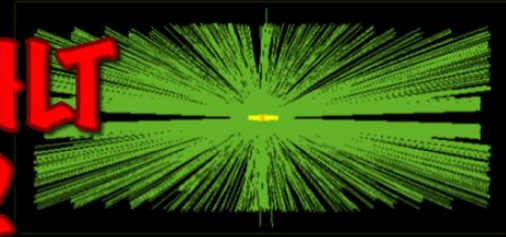


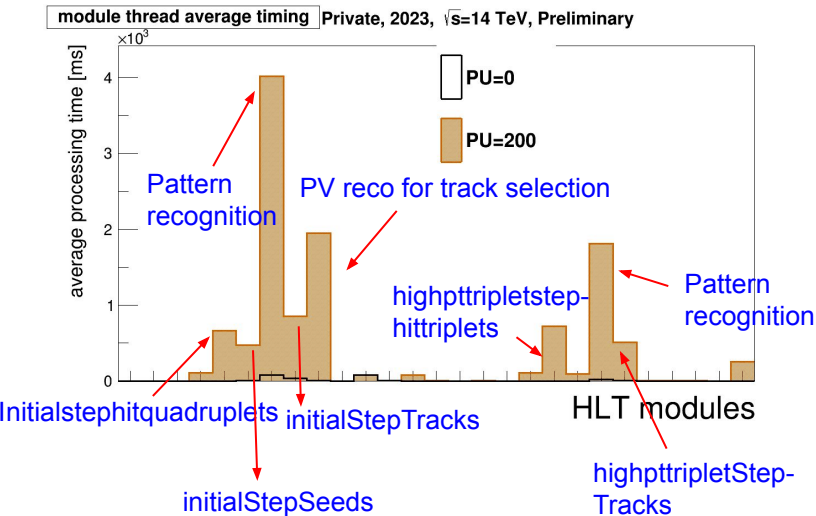
tracking at HLT for phase2

Hevjin Yarar (UniPD & INFN PD),
Mia Tosi (UniPD & INFN)

HLT Phase 2 Meeting
March 17, 2020



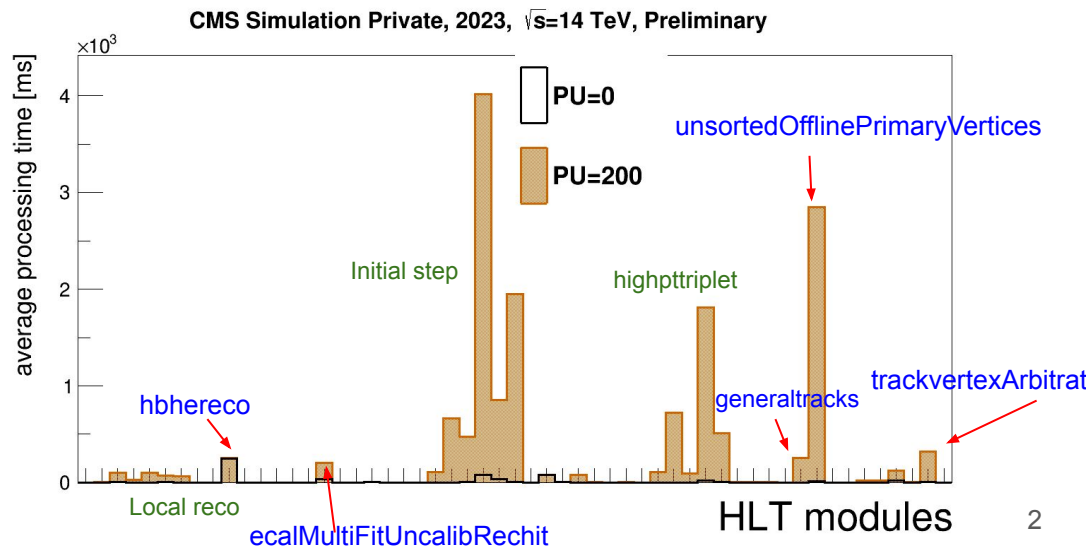
v2 - Baseline Timing



Inner tracking / total [% of total]
 PU=0: 0.255 / 0.600 s [42%]
 PU=200 : 11.537 / 15.985 s [72%]

Inner tracking: up to and including merging of the 2 iterations (top left)

Total: including vertex reco (bottom right)

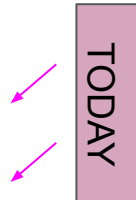


MC_Tracking current versions

v3, v4 and v6 will be uploaded after

- module prefix update to hltPhase2xxxx and
- some modules being imported from release and not overwritten by config (please let us know any such modules relevant for your studies)

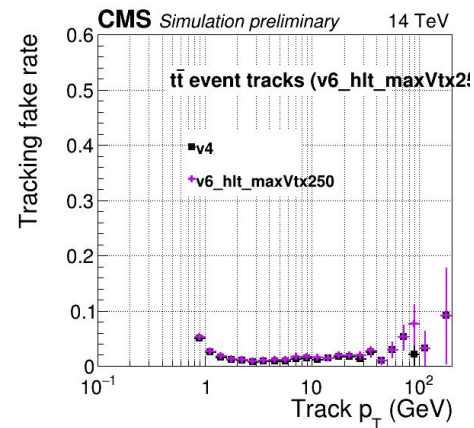
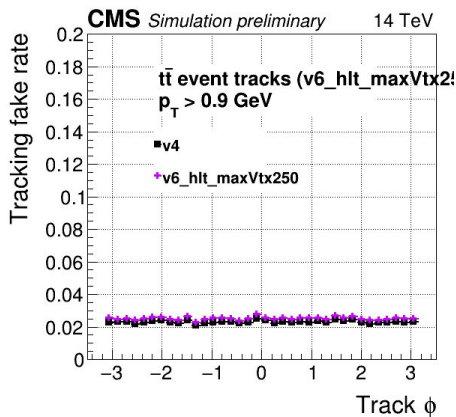
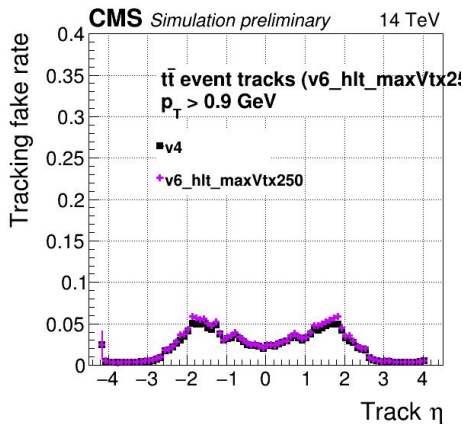
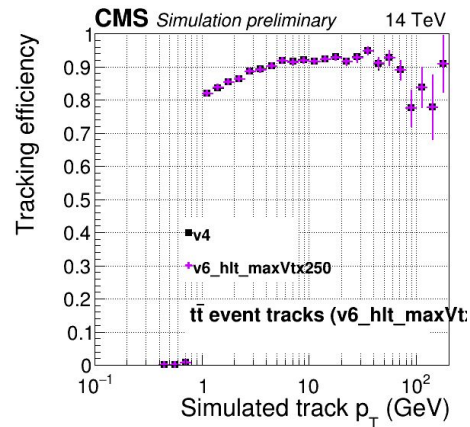
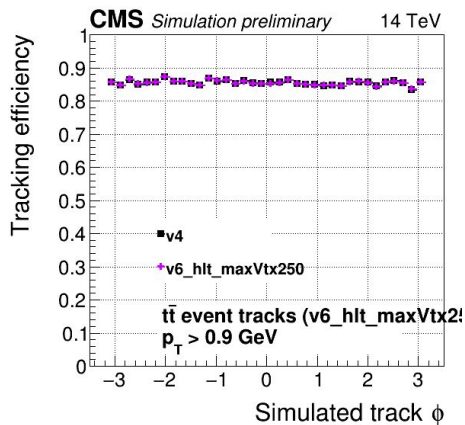
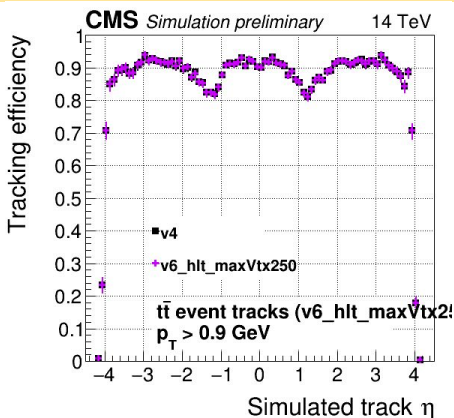
cff file name	Description	Tracking Timing [s]
MC_Tracking_v2	2 iterations	11.4
MC_Tracking_v3	v2 + ($pt > 0.9$)	6.4
MC_Tracking_v4	v3 + track building optimized	5.5
MC_Tracking_v4_1	v4 + $ \eta < 3$ for PV reco for track selection	5.4
MC_Tracking_v4_1_1	v4_1 + $pt > 1.5$ or 2 for PV reco for track selection	
MC_Tracking_v4_2	v4_1 + ($ \eta < 3$)	
MC_Tracking_v5	v2 + using beamspot instead of vertices for track selection	work in progress
MC_Tracking_v5_1	v4_2 + using beamspot instead of vertices for track selection	work in progress
MC_Tracking_v6	v4 + pixelVertices	4.6
MC_Tracking_v7	v6 + optimal trackingregions	3.2 (so far)



v6 - Performance (I)

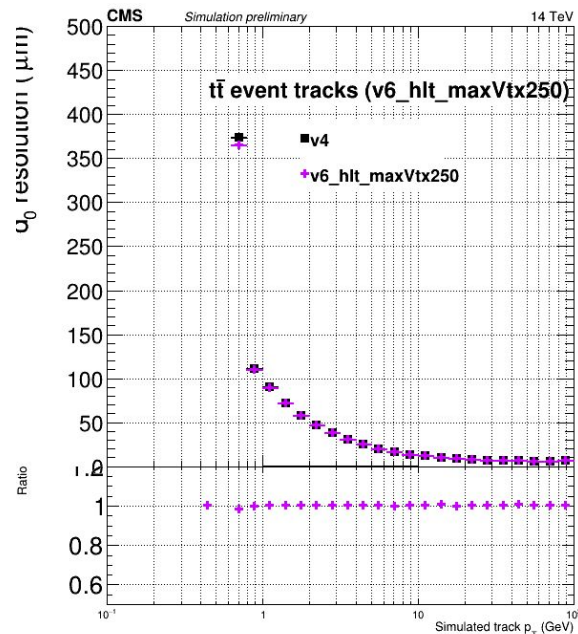
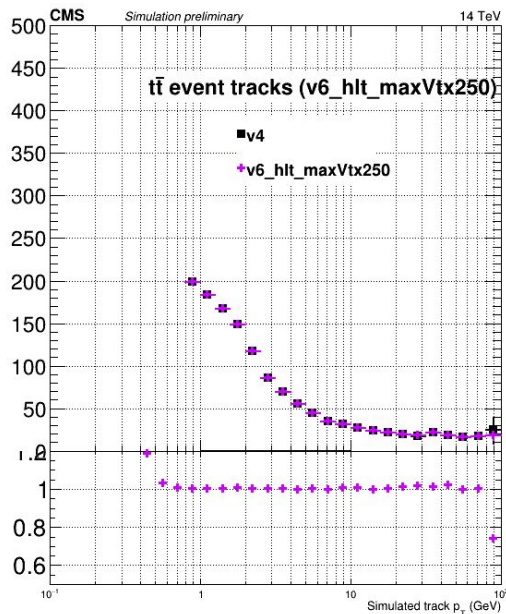
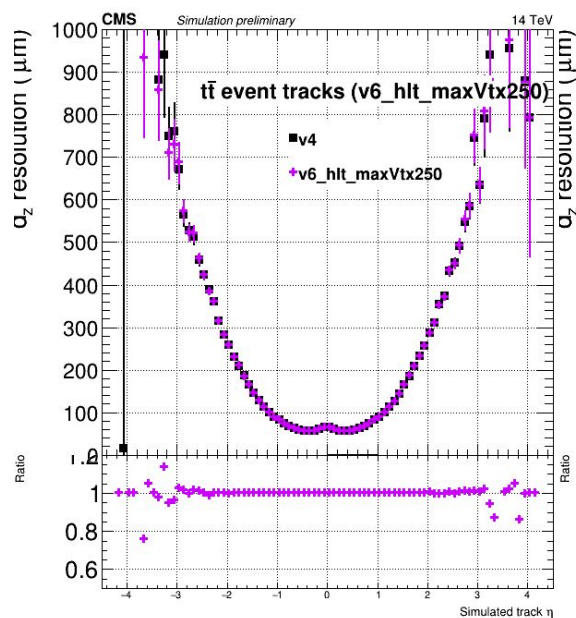
- $P_t > 0.9$
- Track building optimized
- pixelVertices

hltTrimmedPixelVertices.maxVtx = 100 → 250



v6 - Performance (II)

- $P_t > 0.9$
- Track building optimized
- pixelVertices

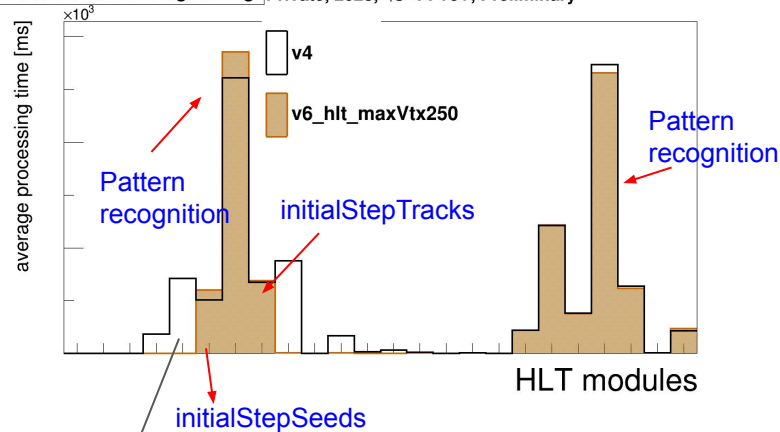


- Deviation of dz resolution at high $|\eta|$.

v6 - Timing (I)

- $P_t > 0.9$
- Track building optimized
- pixelVertices

module thread average timing Private, 2023, $\sqrt{s}=14$ TeV, Preliminary



Same seeding as for pixelTracks,
so no repetition of
doublets/quadruplets

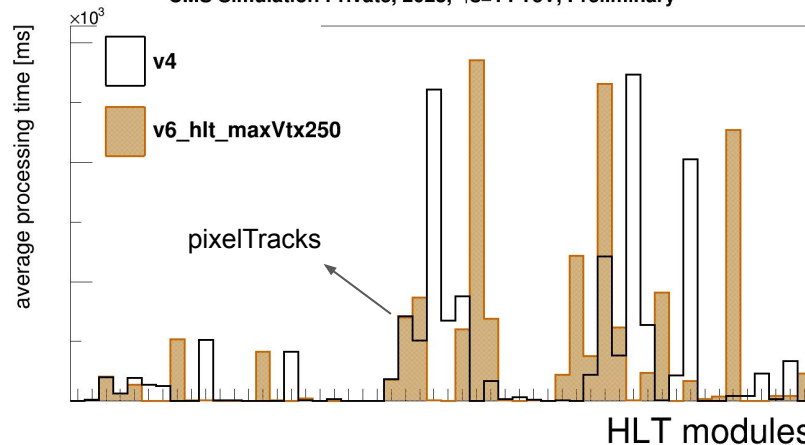
v4 --> 5.51 s [70.58 %]

v6_hlt_maxVtx250 --> 4.64 s [65.88 %]

v4 --> 7.80 s [100 %]

v6_hlt_maxVtx250 --> 8.07 s [100 %]

CMS Simulation Private, 2023, $\sqrt{s}=14$ TeV, Preliminary



v7 - Performance (I)

- $P_t > 0.9$
- Track building optimized
- pixelVertices
- TrackingRegions

We can further decrease by
using same seeding from
pixeltracks

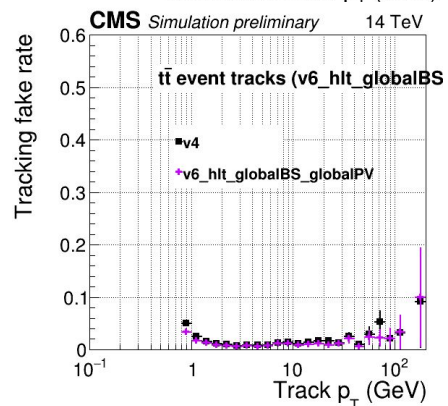
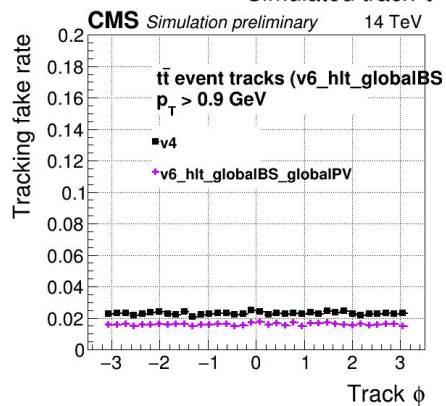
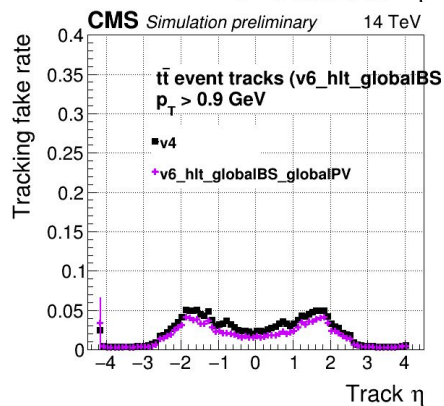
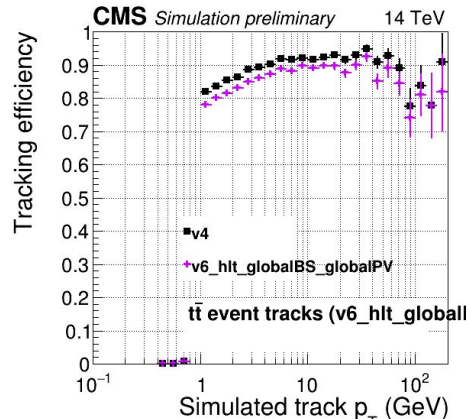
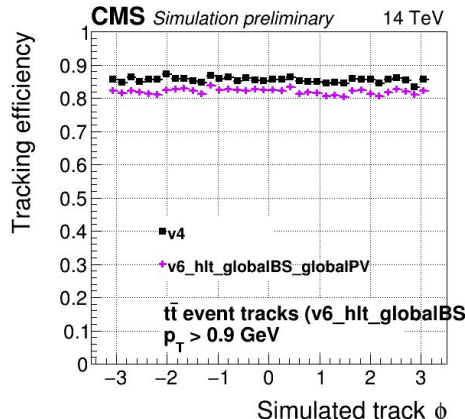
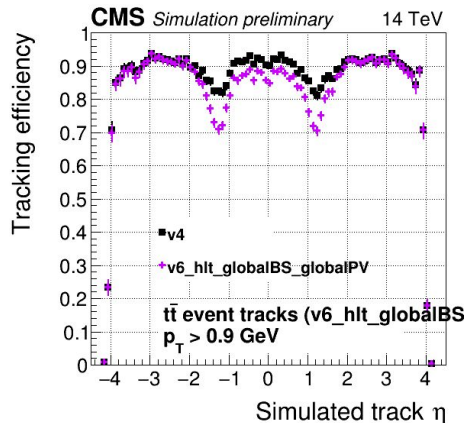
v7 versions so far initialTR_highptTR	inner/full tracking	performance
globalBS_globalPV	3.24 / 6.00 (60 %)	~✓ (overall 81% efficiency)
globalPV_globalBS	4.94 / 8.06 (68 %)	✓ (overall 85% efficiency = v4)
globalPV_globalPV	2.10 / 4.13 (66.29 %)	× (overall efficiency 72 %)

try to improve
performance

try to improve
performance

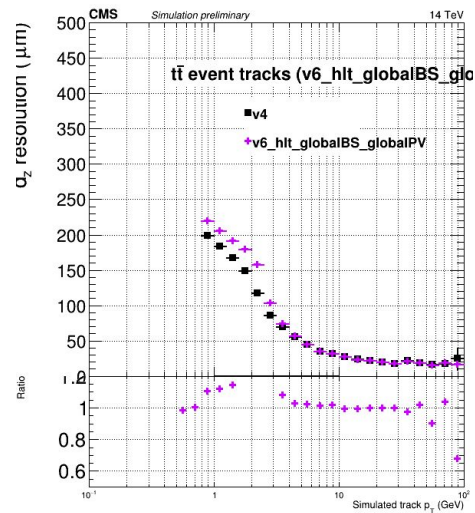
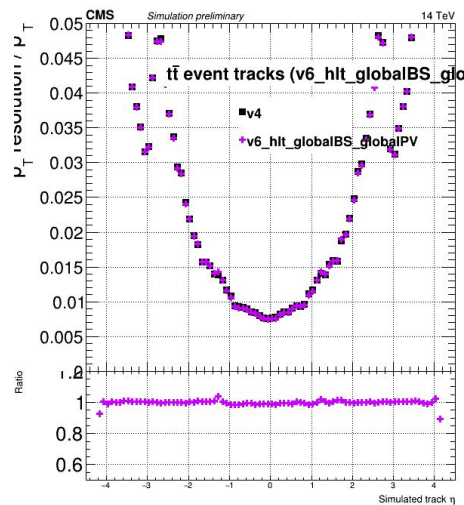
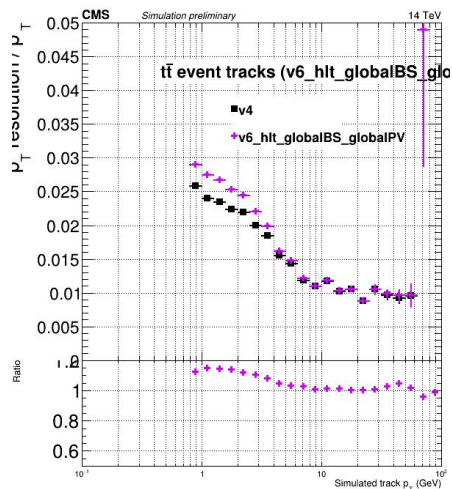
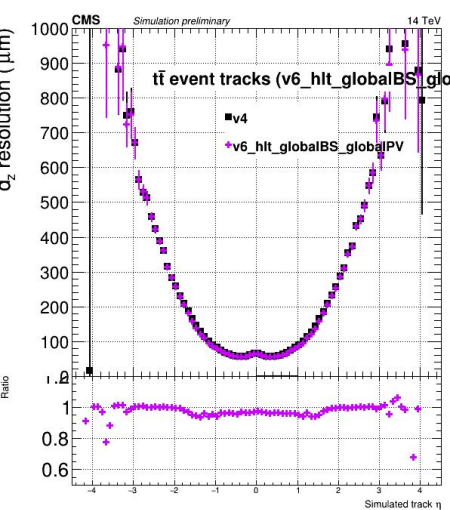
v7 - Performance (II)

- $P_t > 0.9$
- Track building optimized
- pixelVertices
- TrackingRegions - globalBS_globalPV



v7 - Performance (III)

- $P_t > 0.9$
- Track building optimized
- pixelVertices
- TrackingRegions - globalBS_globalPV

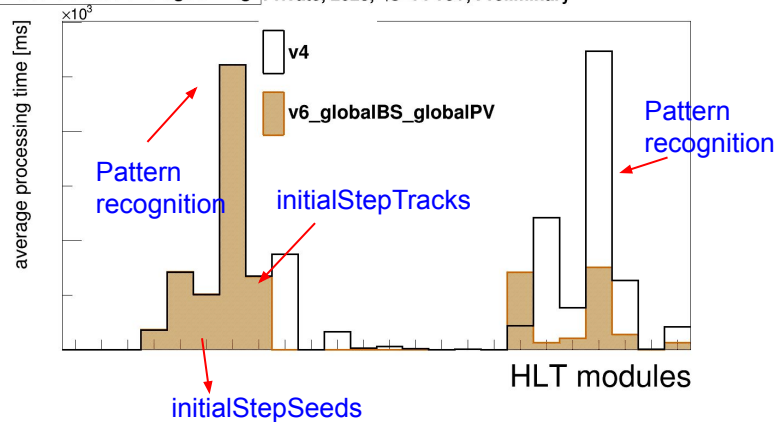


- Deviation of d_z resolution at high $|\eta|$.
- Resolution decrease at low p_t

v7 - Timing

- $P_t > 0.9$
- Track building optimized
- pixelVertices
- TrackingRegions - globalBS_globalPV

module thread average timing Private, 2023, $\sqrt{s}=14$ TeV, Preliminary



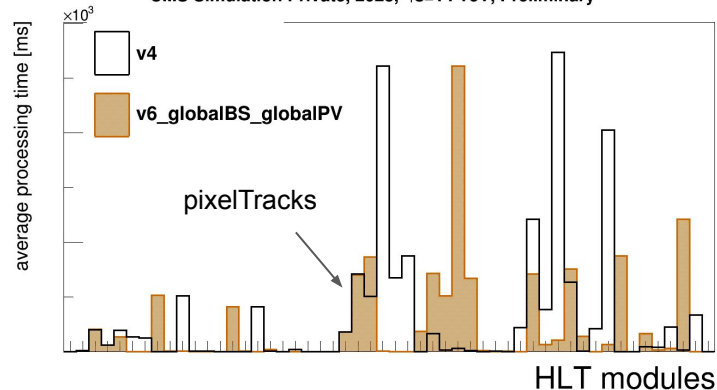
v4 --> 5.51 s [70.58 %]

v6_offline_globalBS_globalPV --> 3.24 s [60.64 %]

v4 --> 7.80 s [100 %]

v6_offline_globalBS_globalPV --> 6.00 s [100 %]

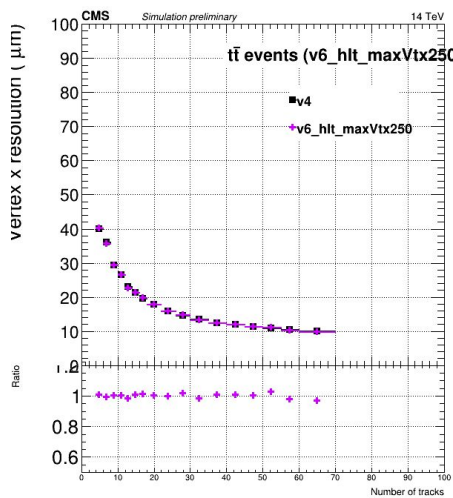
CMS Simulation Private, 2023, $\sqrt{s}=14$ TeV, Preliminary



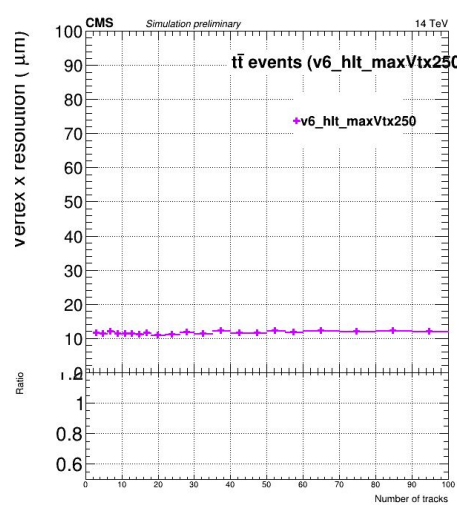
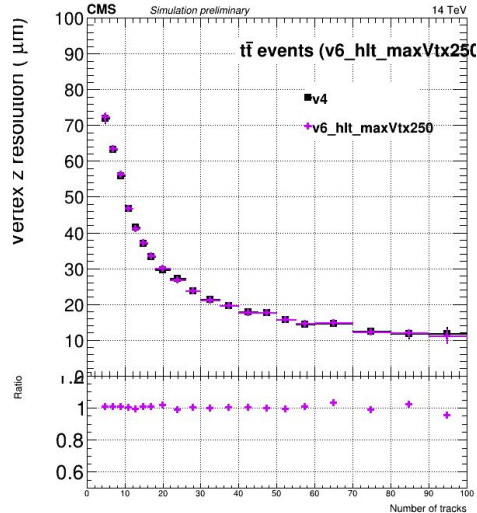
BACKUP

v6 - Performance (III)

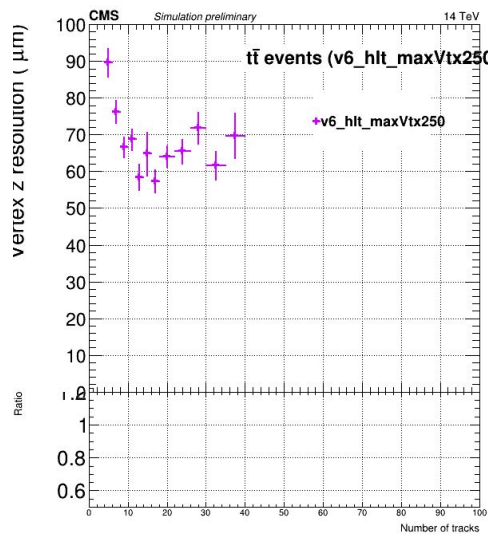
- Pt > 0.9
- Track building optimized
- pixelVertices



Primary vertices - resolution

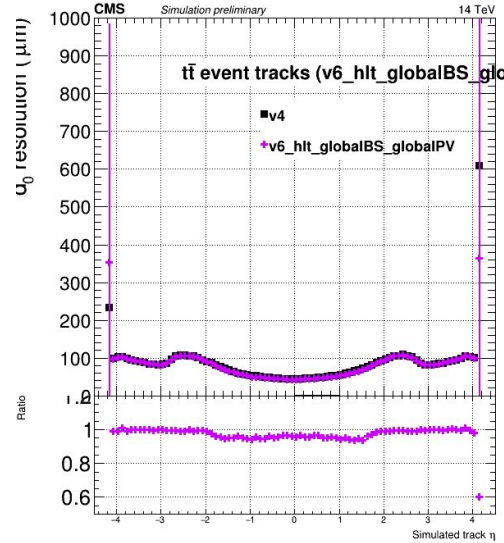
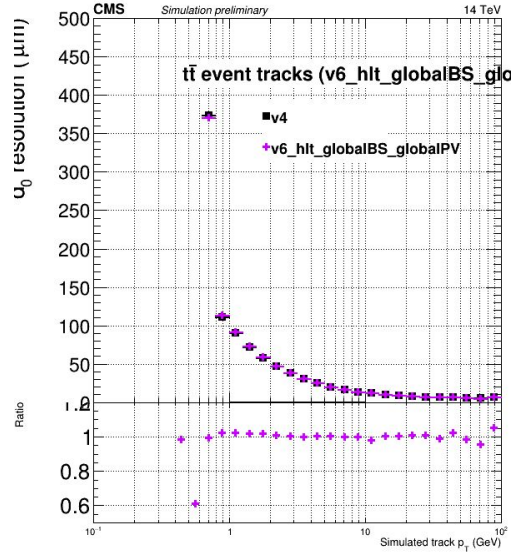


Pixel vertices - resolution



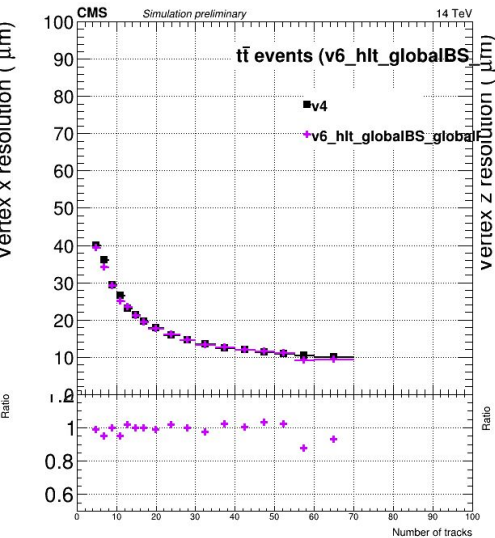
v7 - Performance (IV)

- $P_t > 0.9$
- Track building optimized
- pixelVertices
- TrackingRegions - globalBS_globalPV

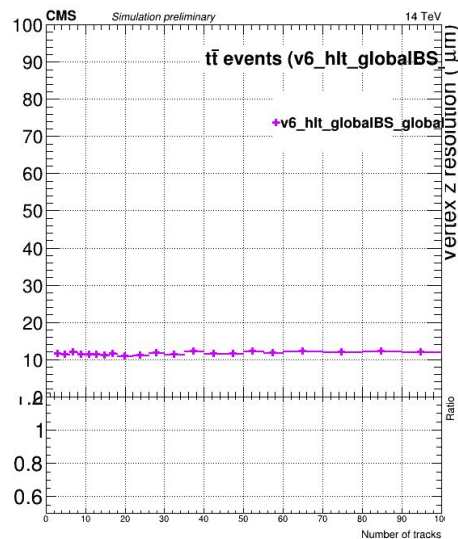
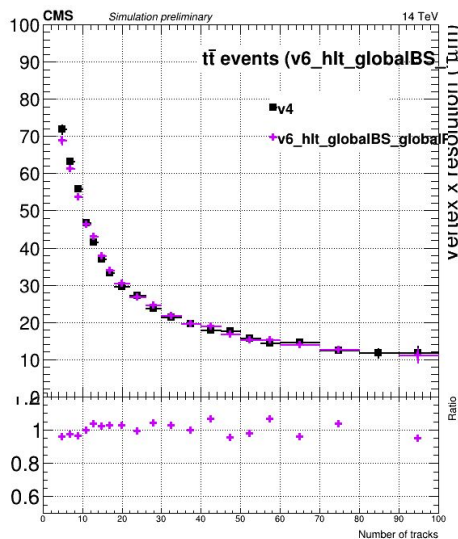


v7 - Performance (V)

- $P_t > 0.9$
- Track building optimized
- pixelVertices
- TrackingRegions - globalBS_globalPV



Primary vertices - resolution



Pixel vertices - resolution

