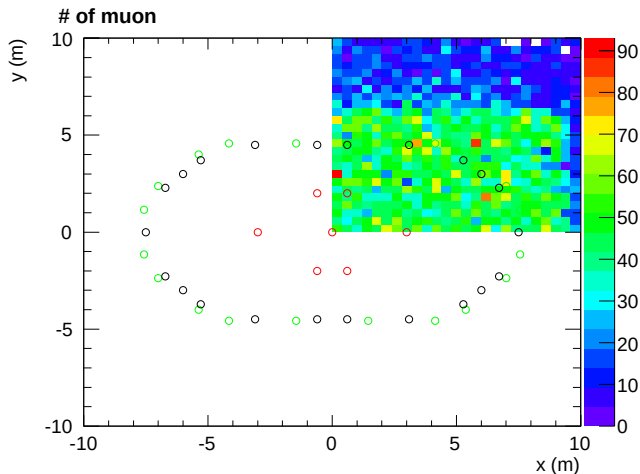
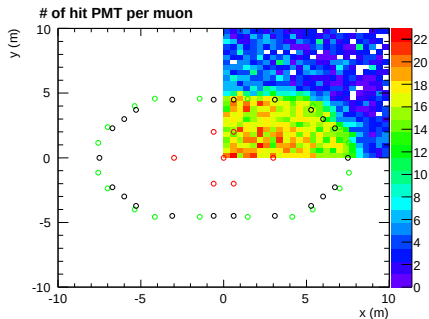
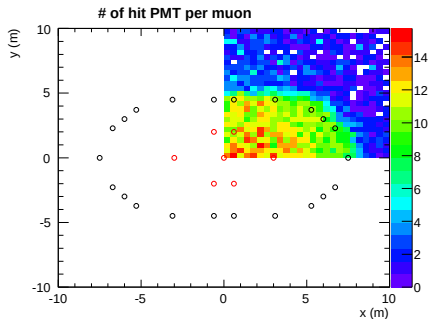


Number of muons passing through the bottom plane



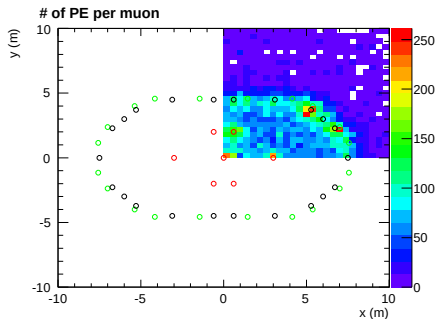
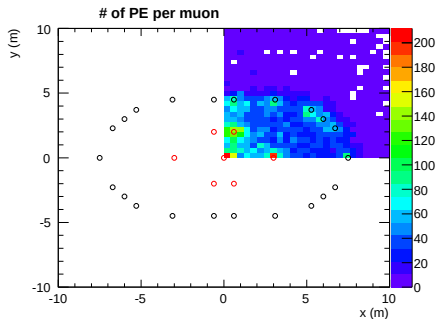
- Red circles: Bottom PMTs which fired more than 7000 times. Black circles: Bottom PMTs which fired around 3000~4000 times. Green circles: Wall PMTs.

Number of hit PMTs



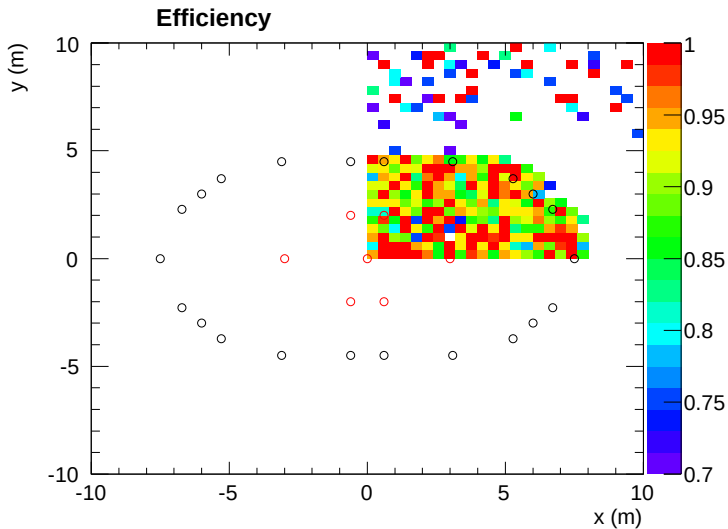
- Left: number of hit PMTs in the bottom 29 PMTs ($z = -4612$ mm).
- Right: number of hit PMTs in the bottom 29 PMTs + 20 PMTs in the bottom row of wall PMTs ($z = -4581$ mm).

Number of photo electrons

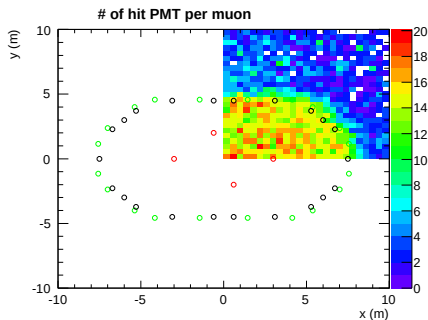
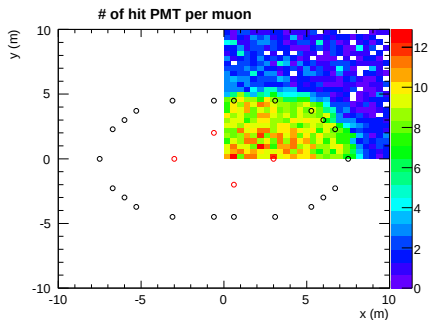


- Left: number of PEs collected in the bottom 29 PMTs ($z=-4612$ mm).
- Right: number of PEs collected in the bottom 29 PMTs + 20 PMTs in the bottom row of wall PMTs ($z=-4581$ mm).

Efficiency (≥ 12 hit PMT)

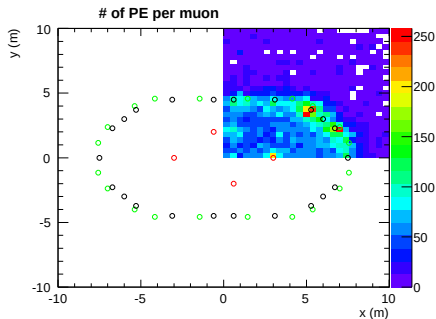
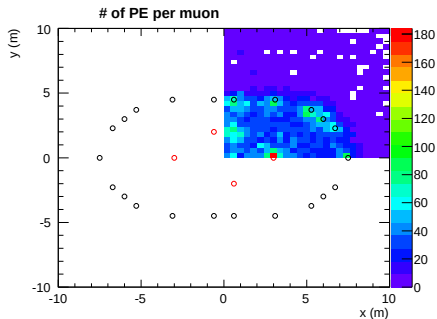


Remove 3 PMTs



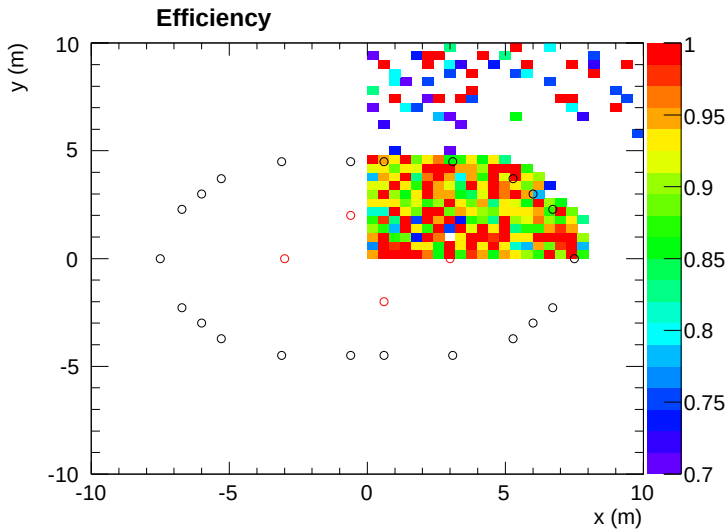
- Left: number of hit PMTs in the bottom 26 PMTs ($z=-4612$ mm).
- Right: number of hit PMTs in the bottom 26 PMTs + 20 PMTs in the bottom row of wall PMTs ($z=-4581$ mm).

Remove 3 PMTs

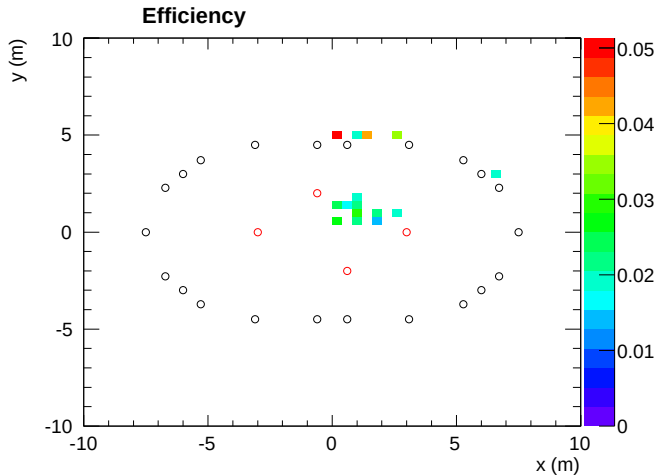


- Left: number of PEs collected in the bottom 26 PMTs ($z=-4612$ mm).
- Right: number of PEs collected in the bottom 26 PMTs + 20 PMTs in the bottom row of wall PMTs ($z=-4581$ mm).

Efficiency after remove 3 PMTs(≥ 12 hit PMT)

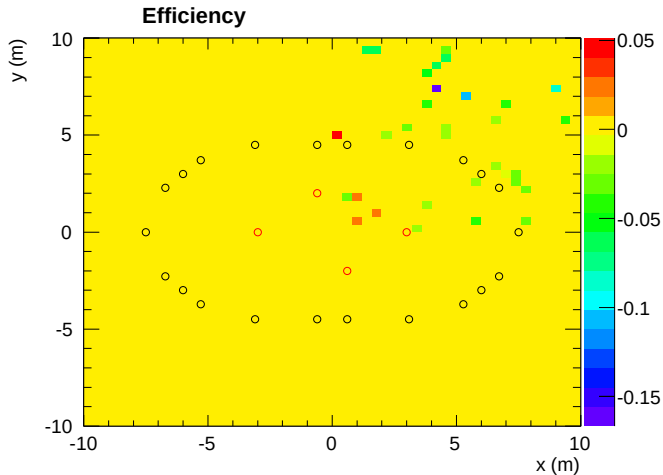


Absolute efficiency change (≥ 12 hit PMT)



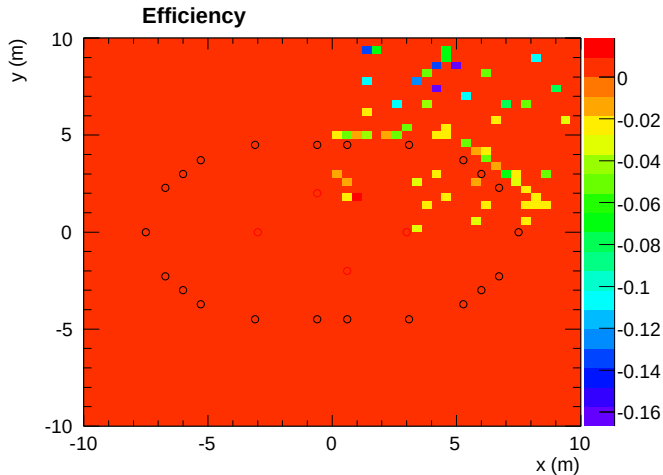
● $\text{Eff}(\geq 12) - \text{Eff}_{\text{remove3}}(\geq 12)$

Absolute efficiency change (≥ 11 hit PMT)



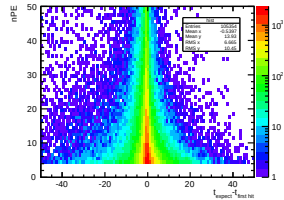
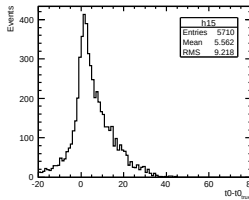
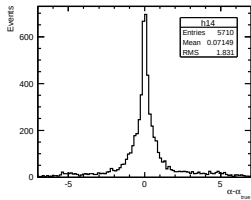
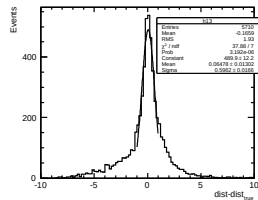
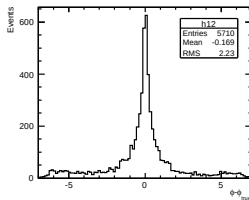
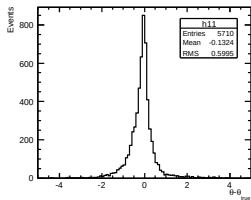
● $\text{Eff}(\geq 12) - \text{Eff}_{\text{remove3}}(\geq 11)$

Absolute efficiency change (≥ 10 hit PMT)



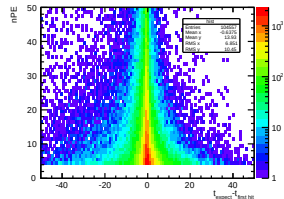
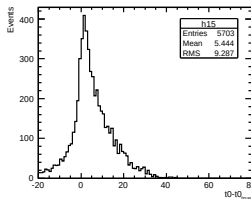
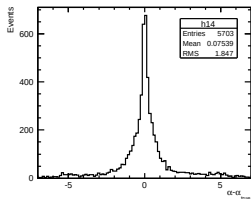
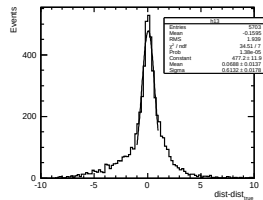
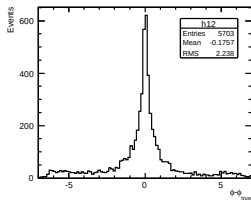
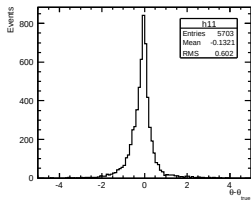
● $\text{Eff}(\geq 12) - \text{Eff}_{\text{remove3}}(\geq 10)$

Fit OWS only



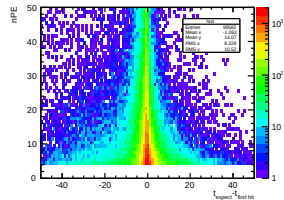
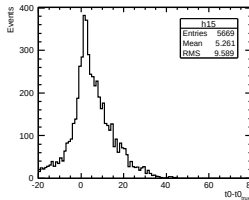
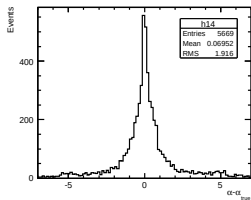
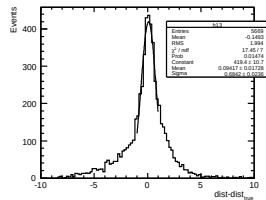
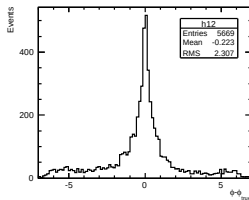
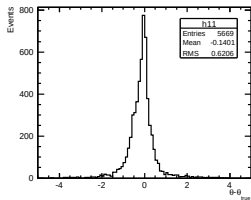
- 5710 converge, Δd RMS: 1.93 m

Remove bottom 3 PMTs



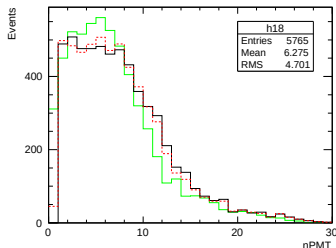
- 5703 converge, Δd RMS: 1.939 m

Remove bottom 29 PMTs



- 5669 converge, Δd RMS: 1.994 m

Number of OWS PMTs in the fit (after selection)



- Black histogram: nominal, mean: 7.30
- Red dashed hitogram: remove 3 PMTs, mean: 7.15
- Green hisogram: remove 29 PMTs, mean: 6.27
- 173 PMTs in OWS, on average, expect mean for Red histogram is 7.17, for Green histogram is 6.08.