

A Brief Background Check For GEM Efficiency in HyCal Calibration Run

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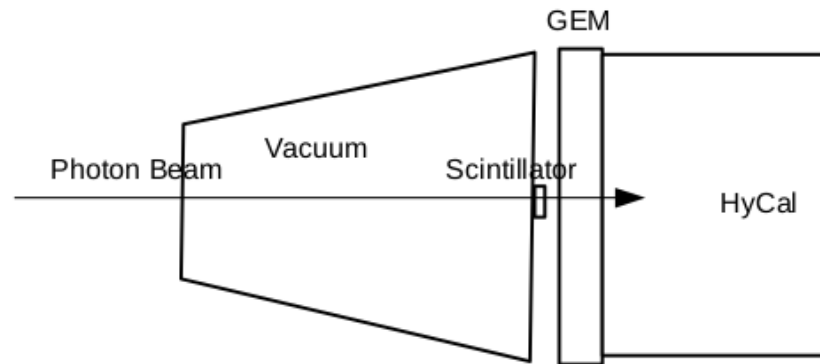
July-29-2016

Preliminary Results On GEM Efficiency

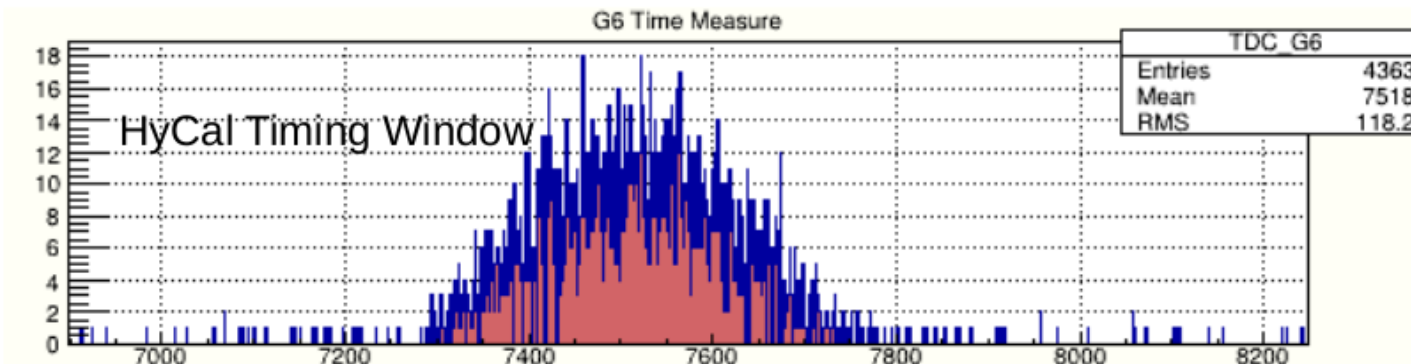
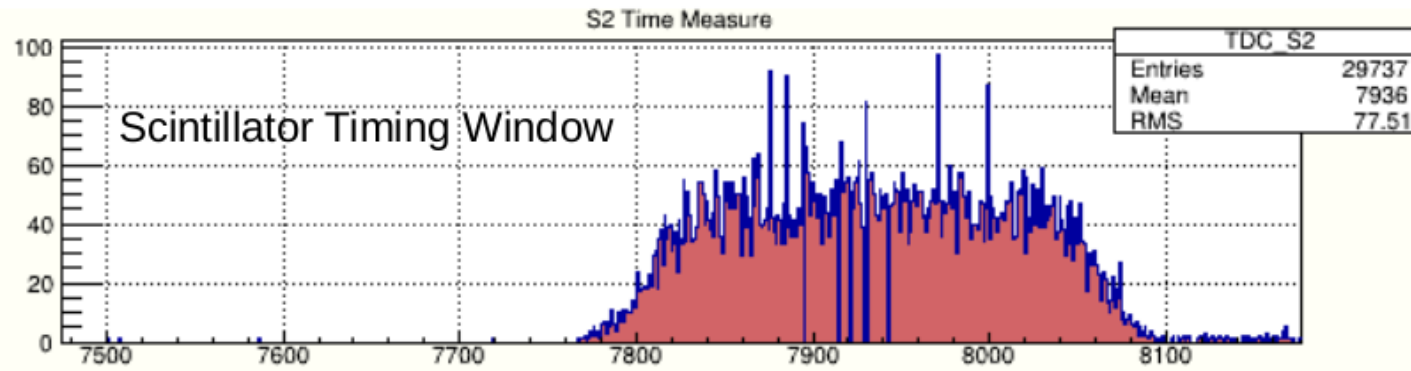
$$\text{Efficiency} = N_{\text{gem}} / N_{\text{tot}}$$

N_{gem} : hits on GEM

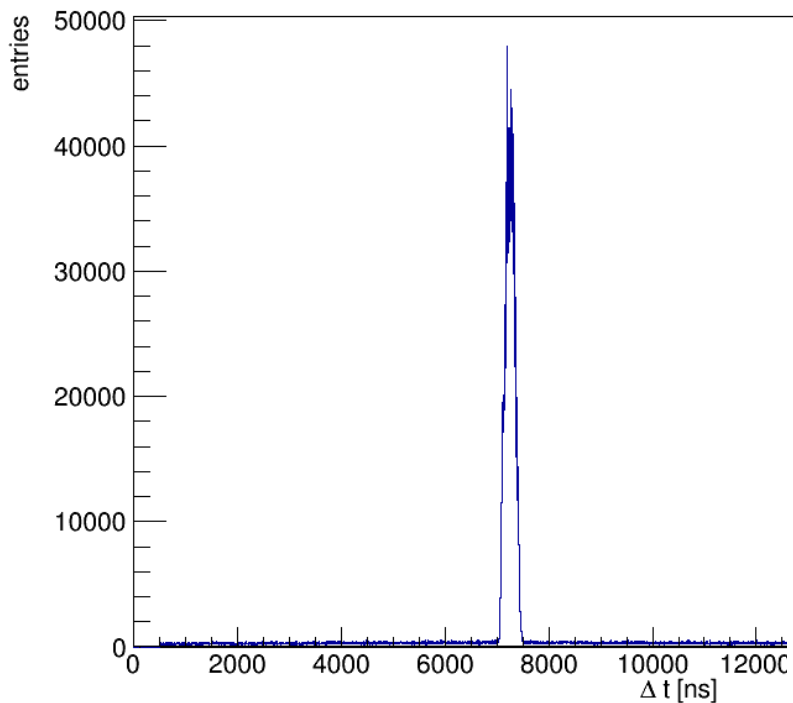
N_{tot} : hits on both scintillator and HyCal.



Use Timing Cut to select hits from Scintillator and HyCal.

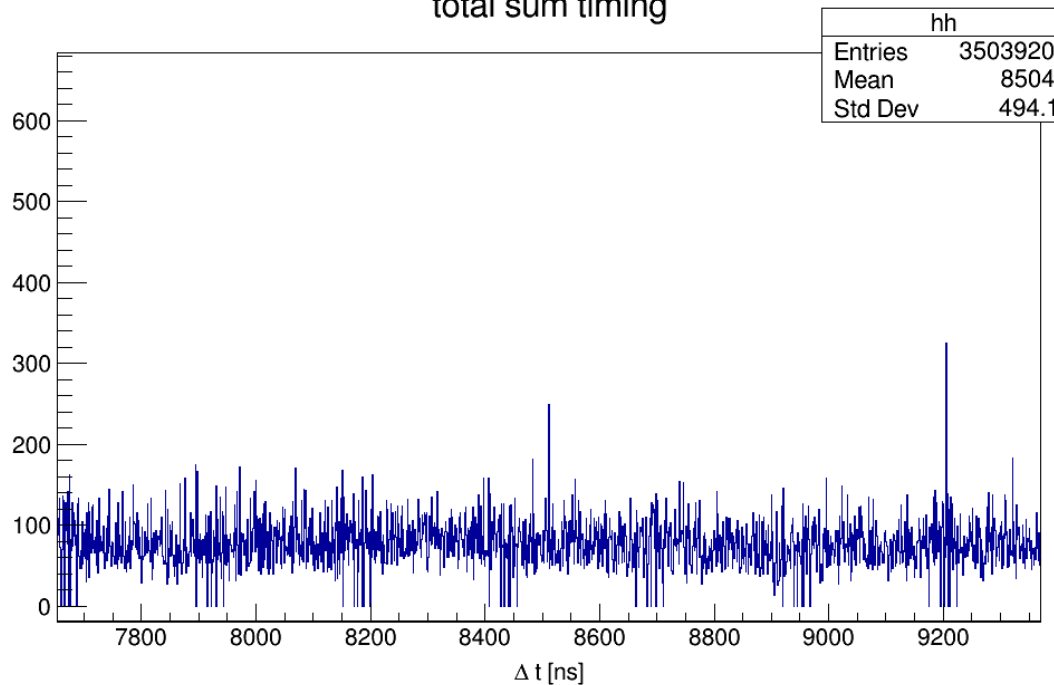


total sum signal timing



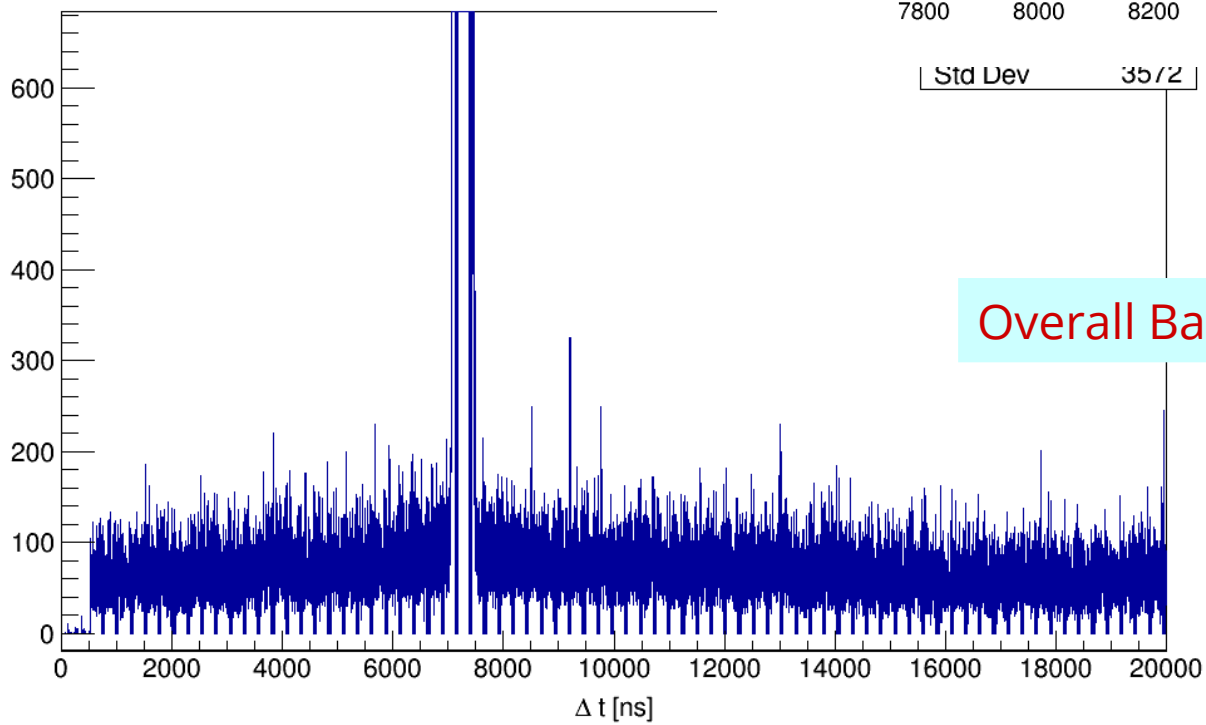
h_calo	
Entries	3503920
Mean	8370
Std Dev	3710

total sum timing



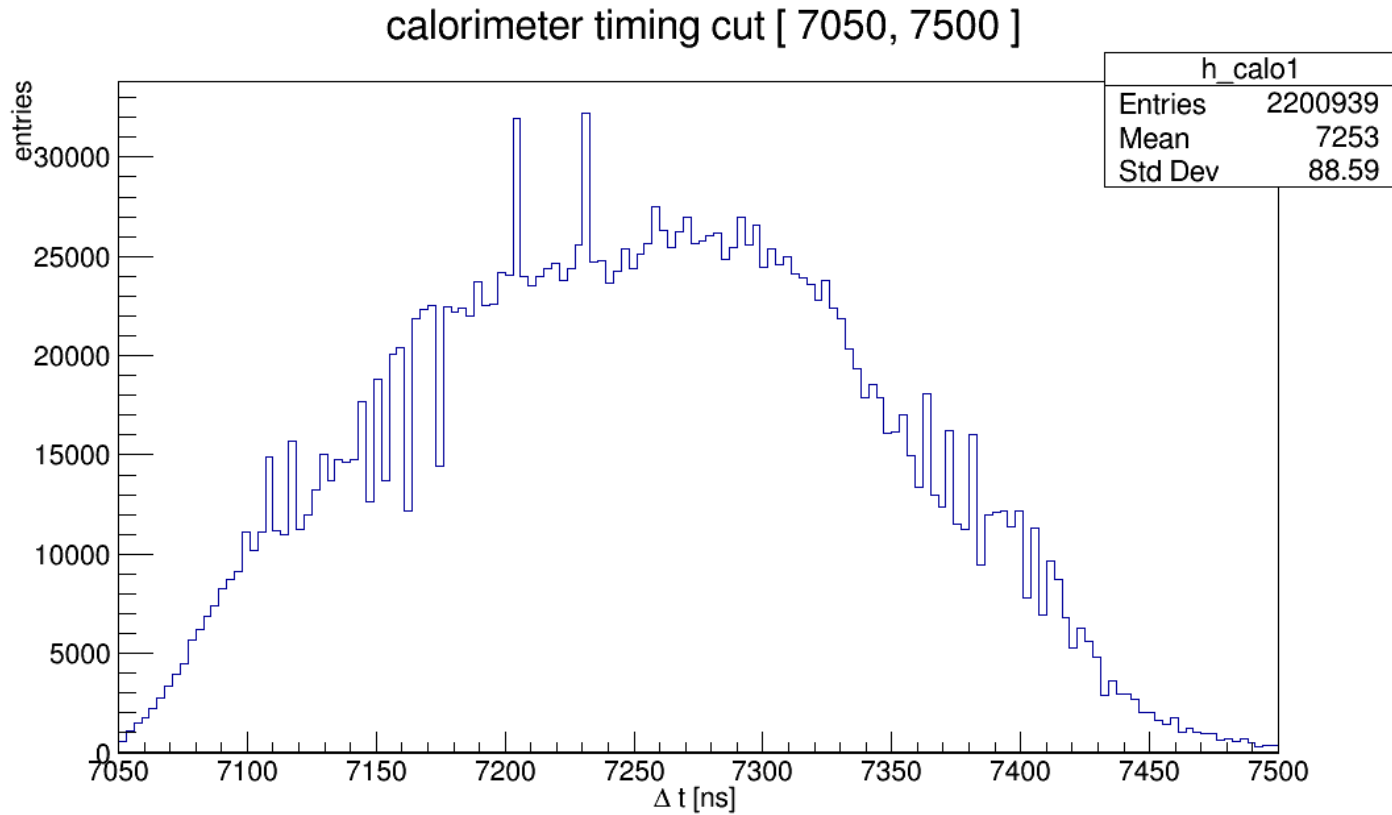
hh	
Entries	3503920
Mean	8504
Std Dev	494.1

total sum timing



Std Dev	3572
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Overall Background Level: ~ 80/ns

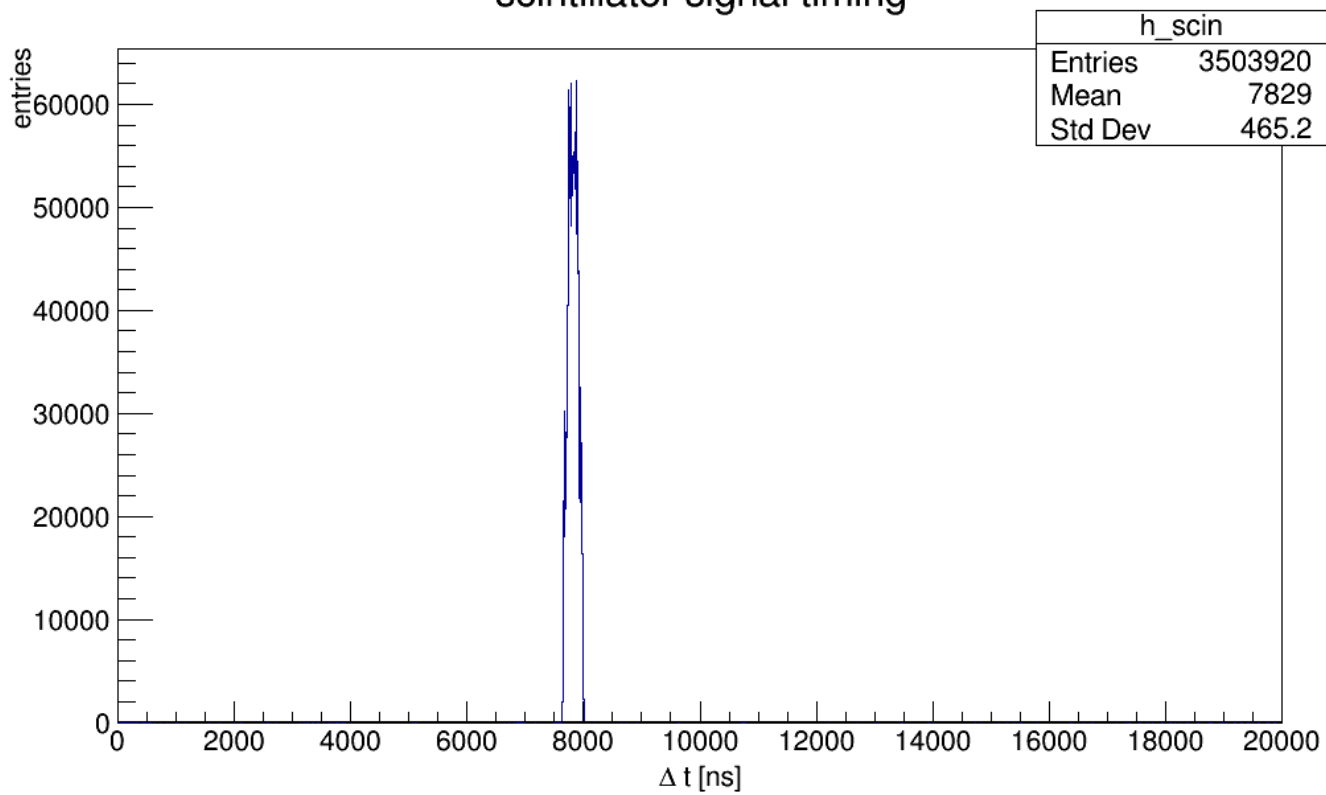


Timing Window Cut Width: 450 ns

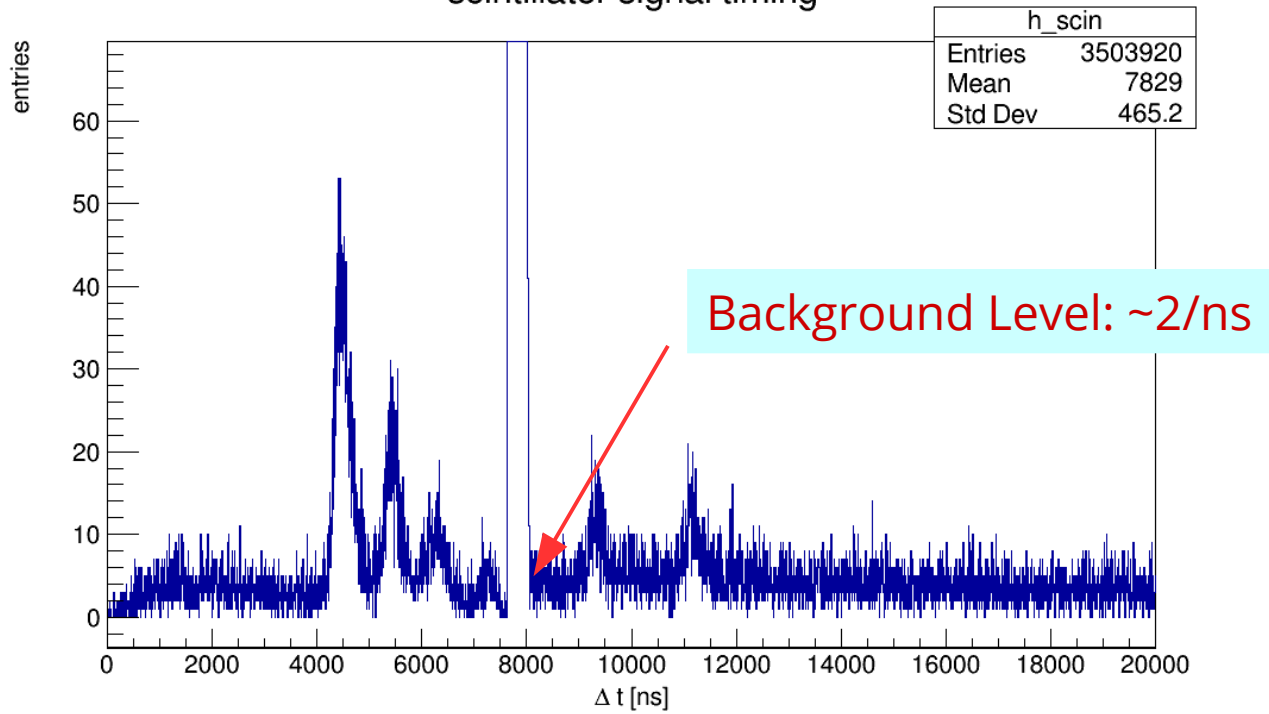
Background level in this window: $\sim 80/\text{ns}$

Total Number of Background Events : 36,000: $\sim 1.6\%$

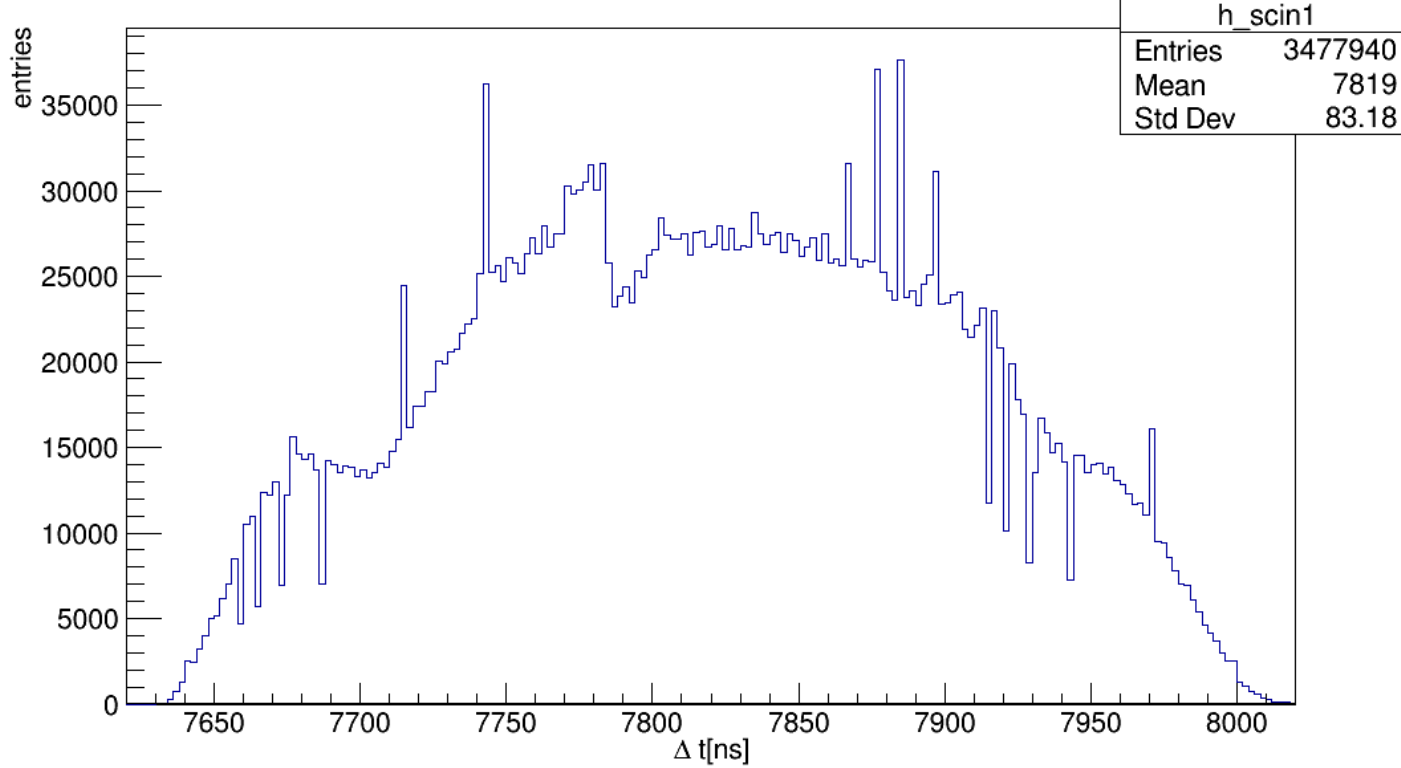
scintillator signal timing



scintillator signal timing



scintillator timing cut [7620, 8020]

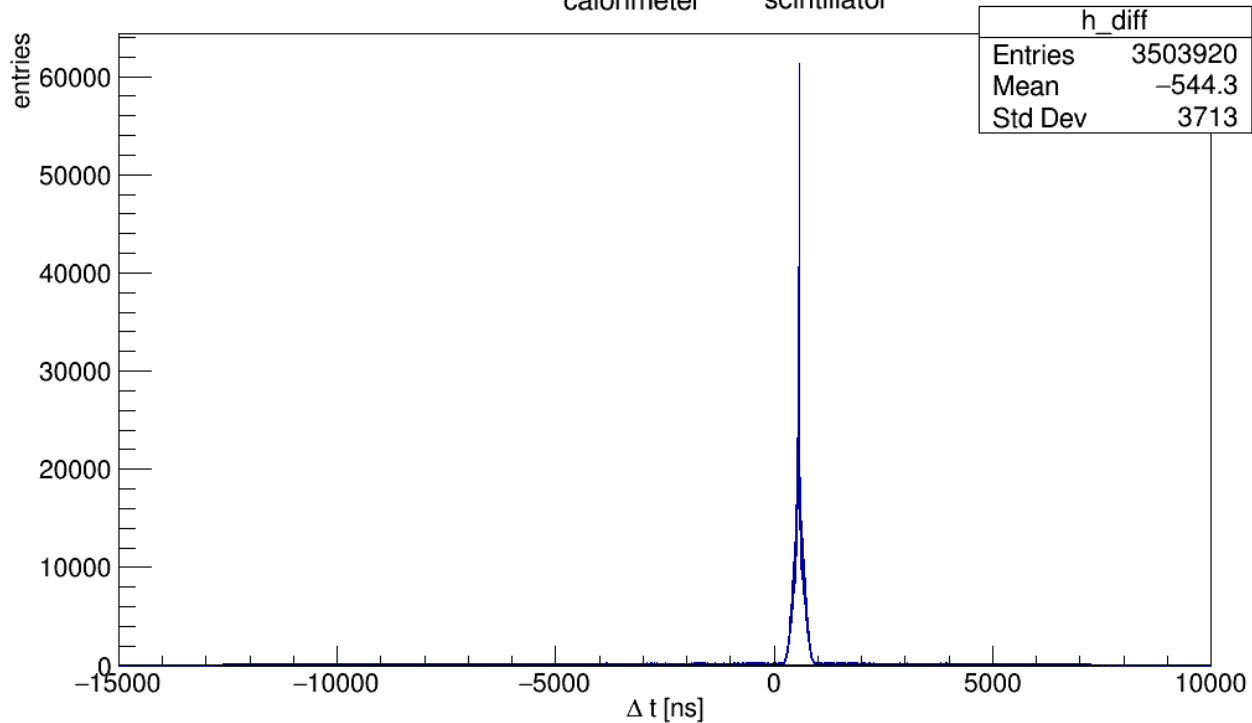


Timing Window Cut Width: 400 ns

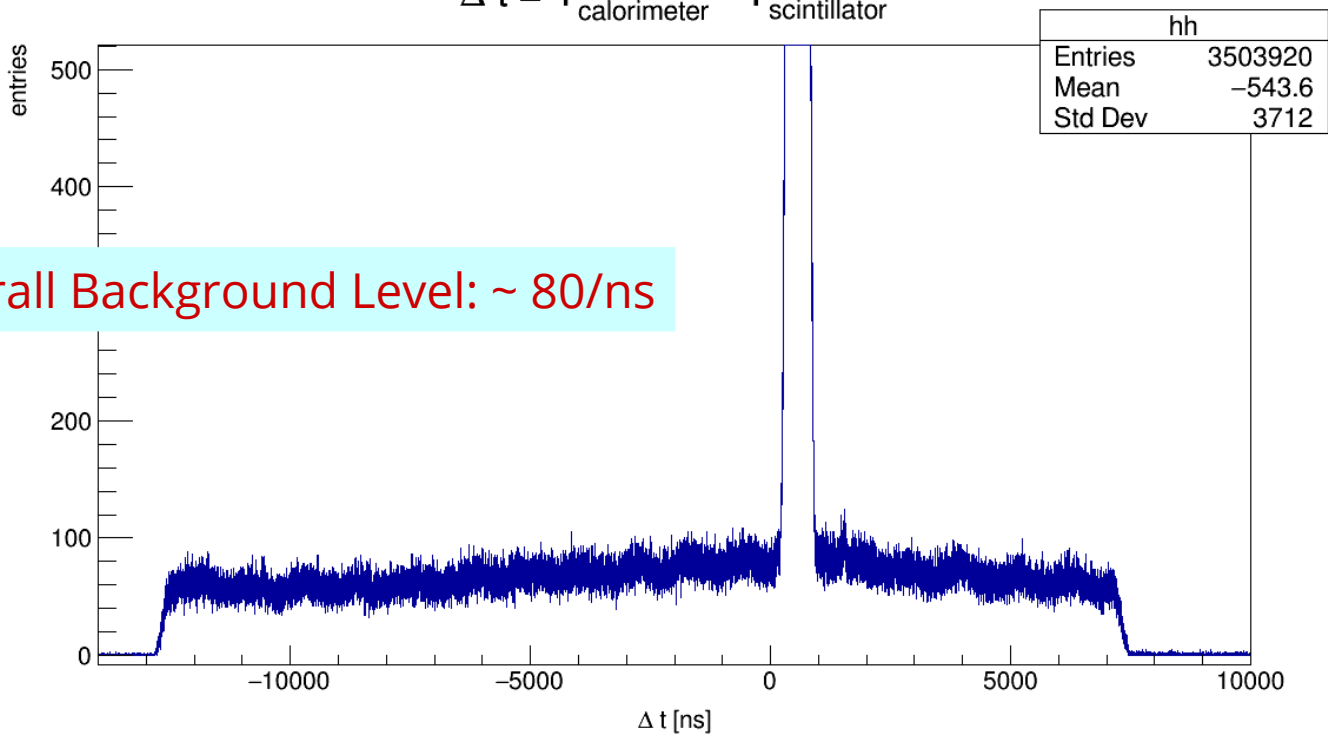
Background level in this window: $\sim 2/\text{ns}$

Total Number of Background Events : 800: $\sim 0.02\%$

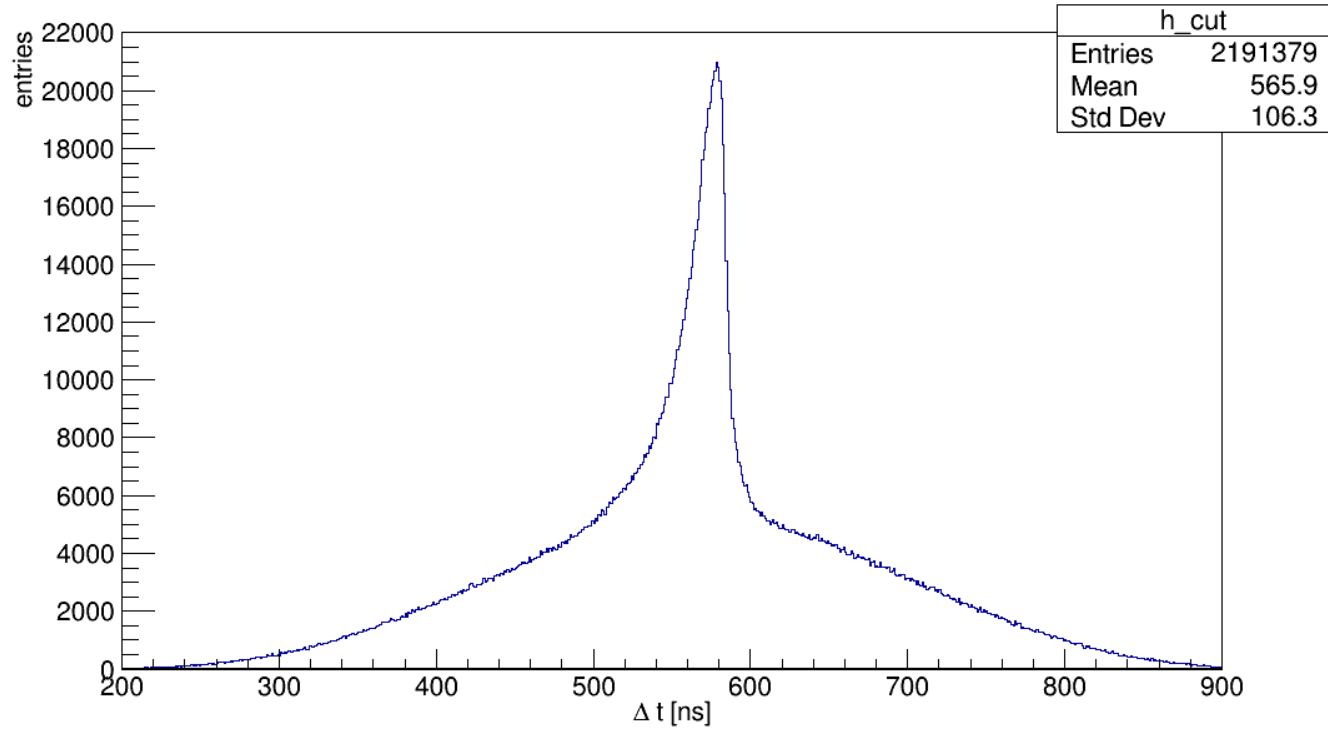
$$\Delta t = T_{\text{calorimeter}} - T_{\text{scintillator}}$$



$$\Delta t = T_{\text{calorimeter}} - T_{\text{scintillator}}$$



var_diff {var_calor>7050 && var_calor<7500 && var_scin>7620 && var_scin<8020}



Timing Cut Window Width: 700 ns
Background Events: 56,000

Total Events After Software Trigger: 267388
GEM Events before matching hycal: 249051
Efficiency: 93.1%

After Background Subtraction: 91.3%