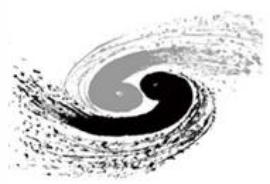


# Measurement of the Bc cross-section using $B_c \rightarrow J/\psi \mu \nu$

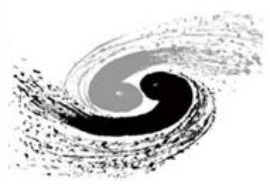
Xianyou Wang, Guoming Chen, Xiangwei Meng,  
Junquan Tao, Jianguo Bian, Zheng Wang, Jian Wang

Institute of High Energy Physics, CAS, Beijing  
Institute of theoretical physics, CQU, CQ



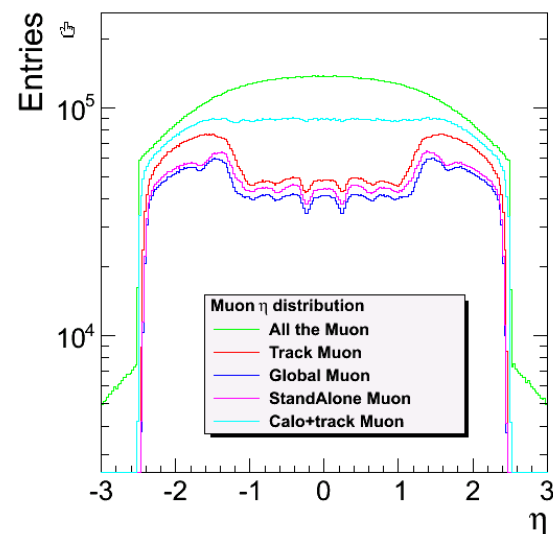
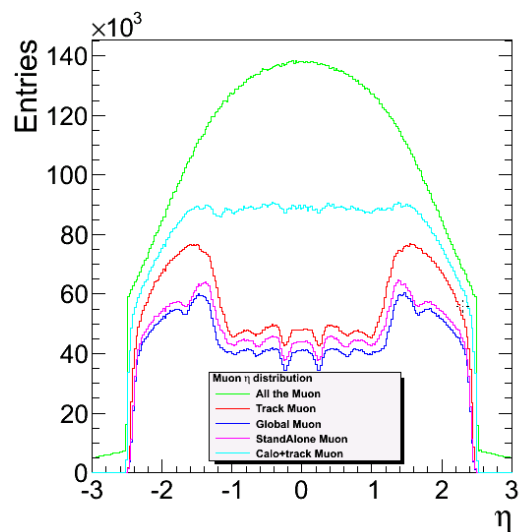
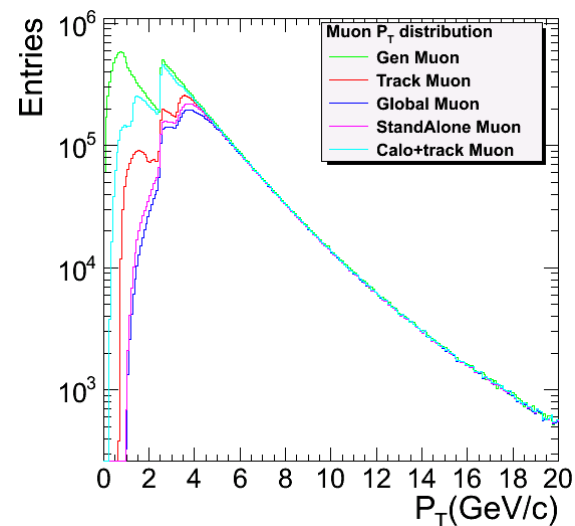
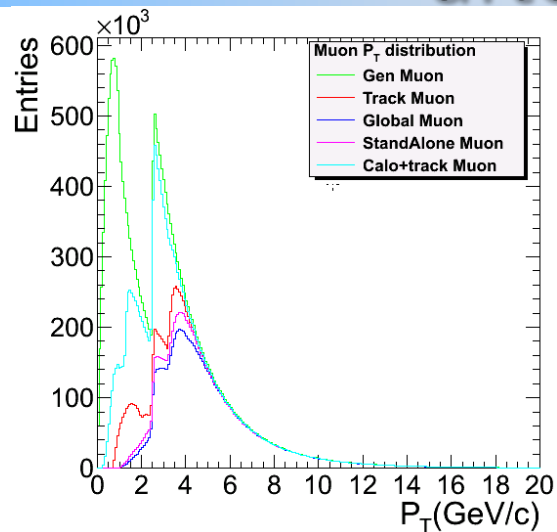
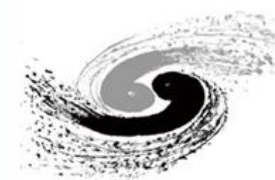
- motivation
- Experimental status
- Event generation
- Related parameters
- Event selection
- Acceptance and trigger efficiency
- Calculate differential cross-section in  $P_t$  bin
- Next steps...

# Analysis data sample

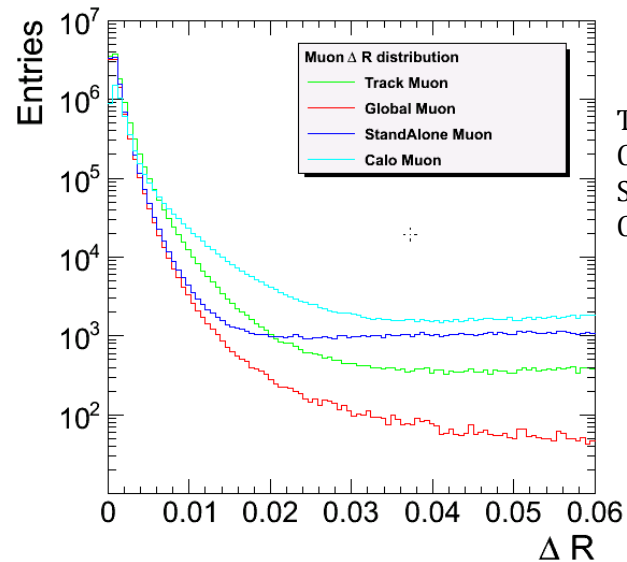
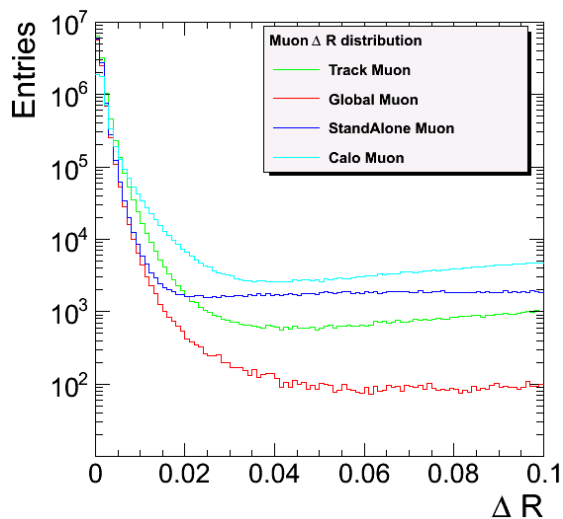
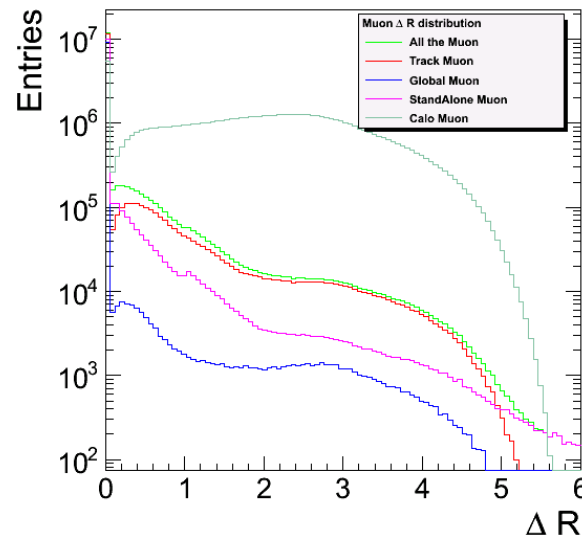
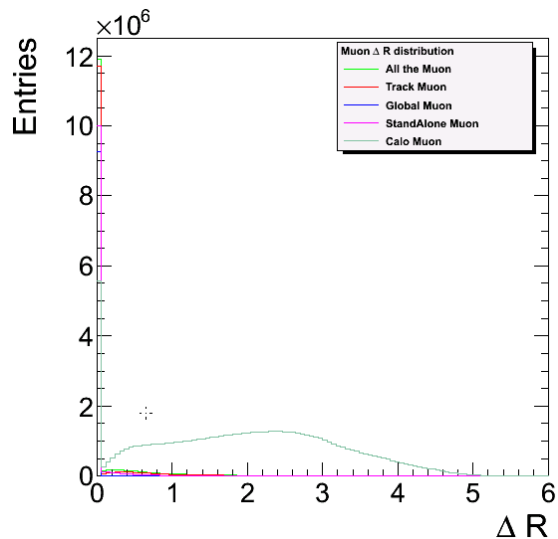
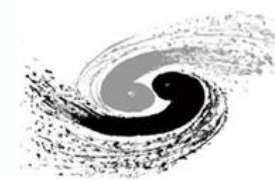


- **Data:**
- **/BtoJPsiMuMu/Summer09-MC\_31X\_V3-v1/GEN-SIM-RECO**
- Events: 10 778 551
- $\int L = 100 \text{ pb}^{-1}$

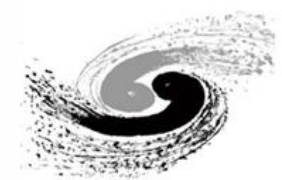
# The muon $p_T$ and Eta distribution after Mc match



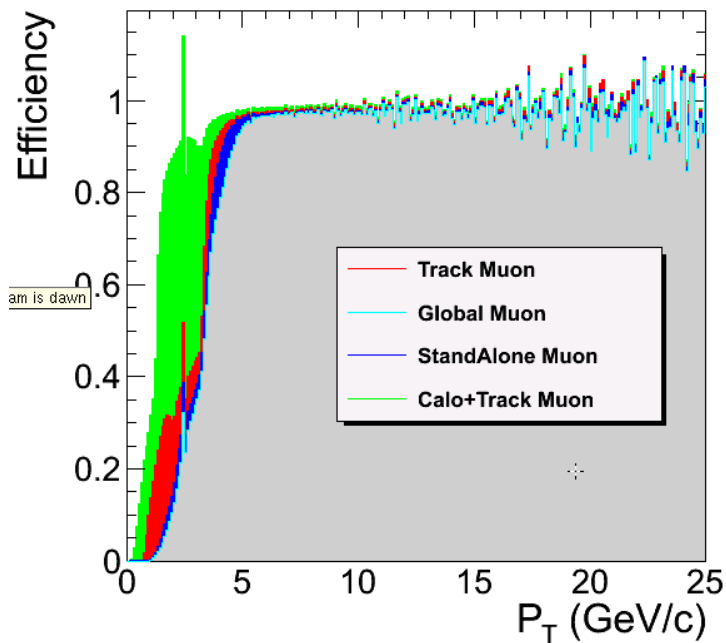
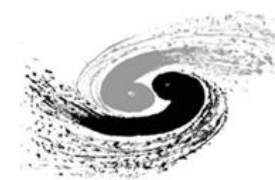
# Muon $\Delta R$ distribution



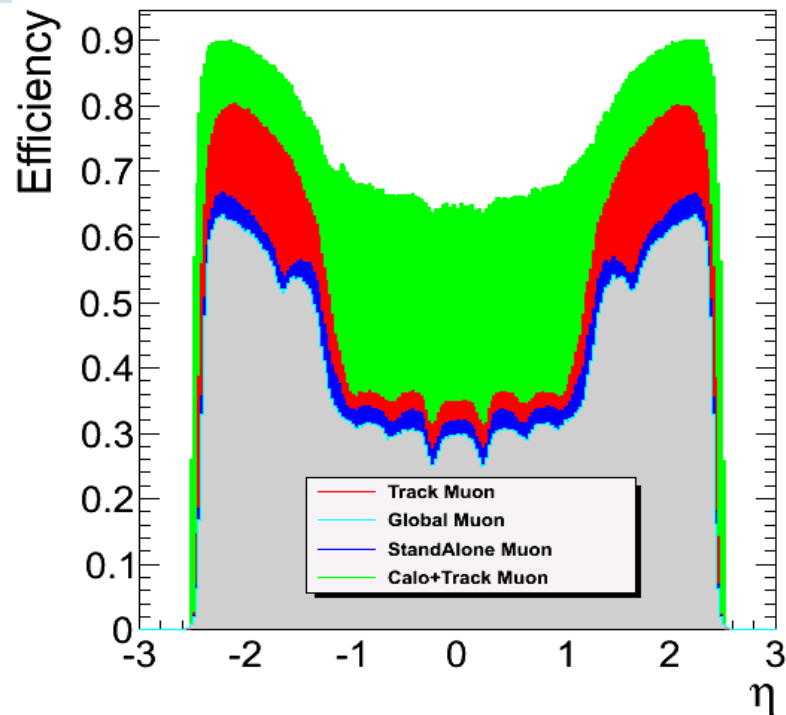
|            |       |
|------------|-------|
| Tracker    | 0.025 |
| Global     | 0.03  |
| Standalone | 0.015 |
| Calo       | 0.03  |



# Muon acceptance

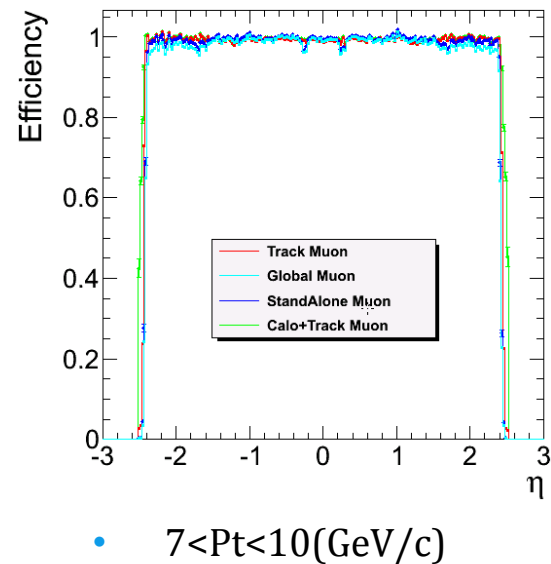
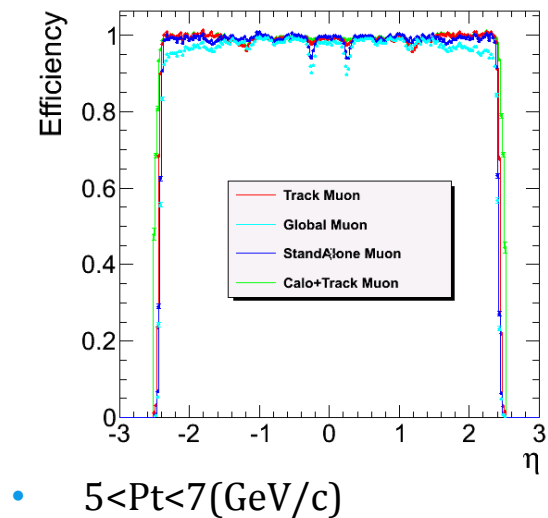
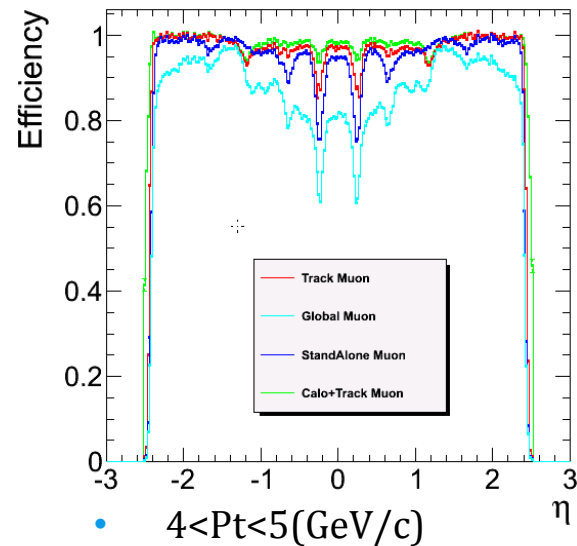
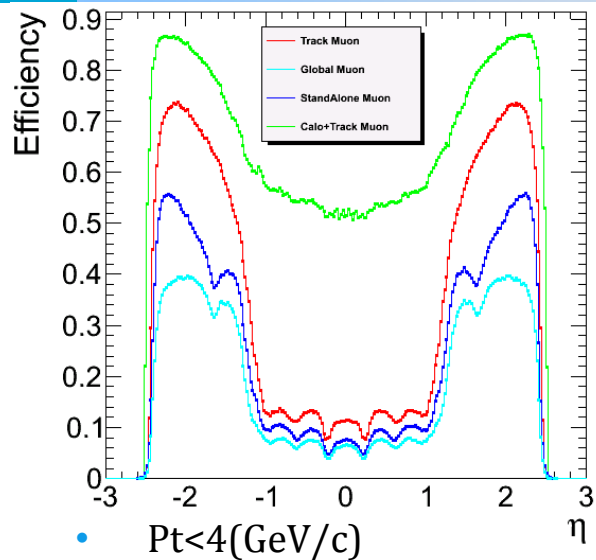
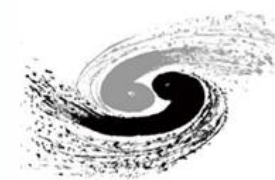


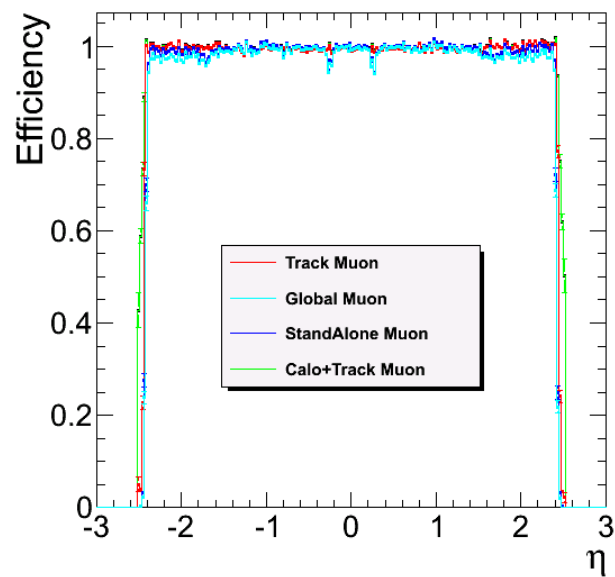
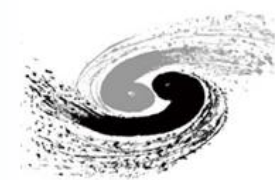
$$\varepsilon_{acc} = N_{Re-matched}(p_t) / N_{Gen}(P_t)$$



$$\varepsilon_{acc} = N_{Re-matched}(\eta) / N_{Gen}(\eta)$$

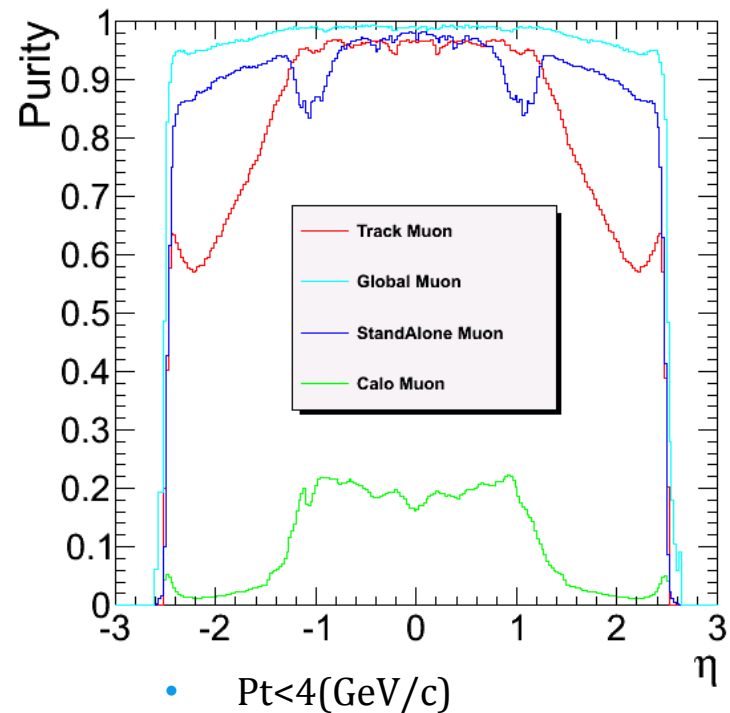
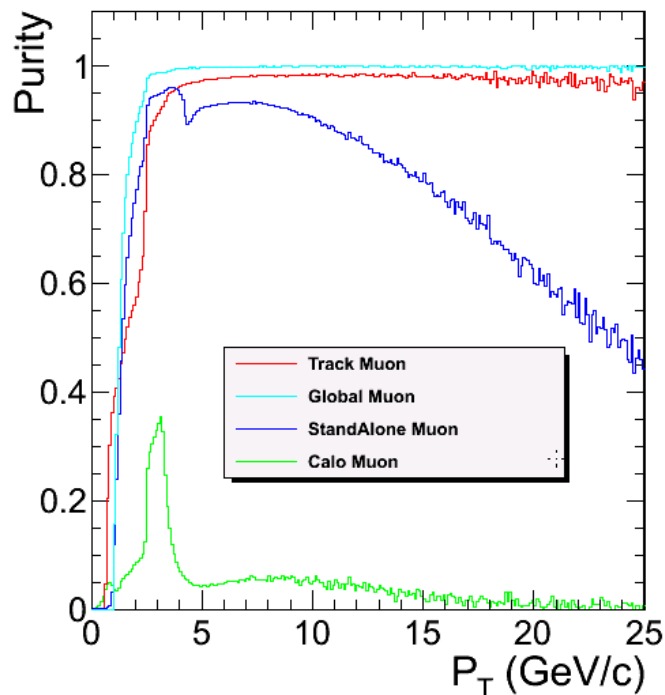
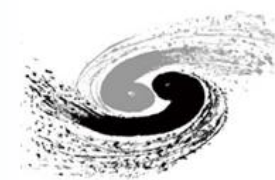
# Different pt bin muon acceptance





- $P_t > 10(\text{GeV}/c)$

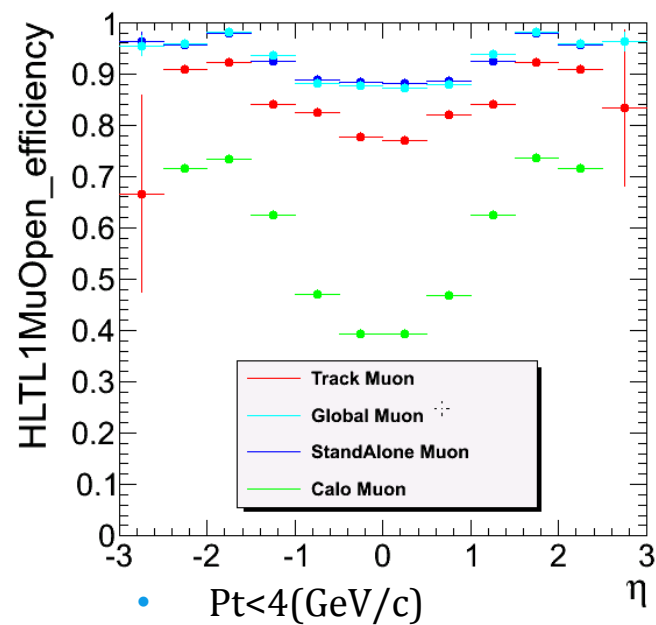
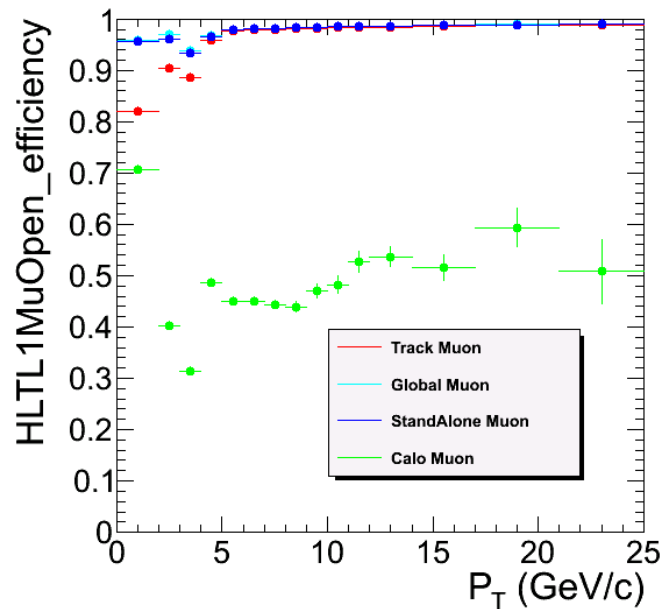
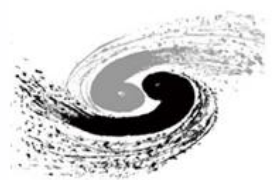
# The purity of the Reconstructed muon



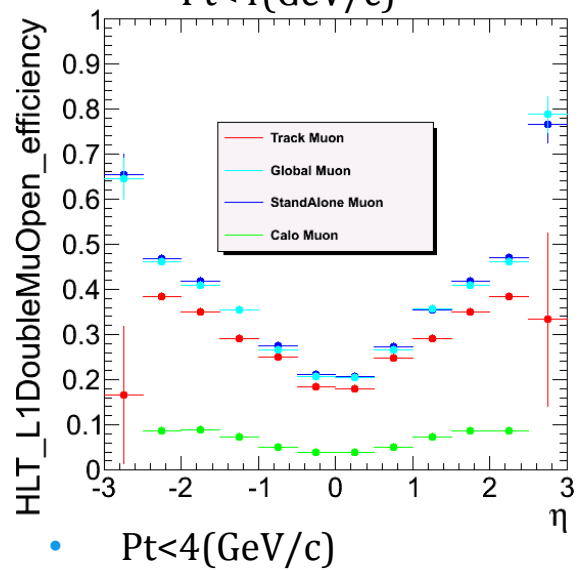
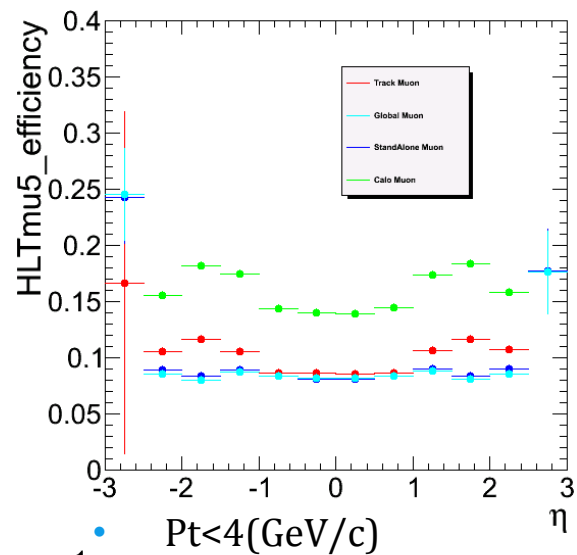
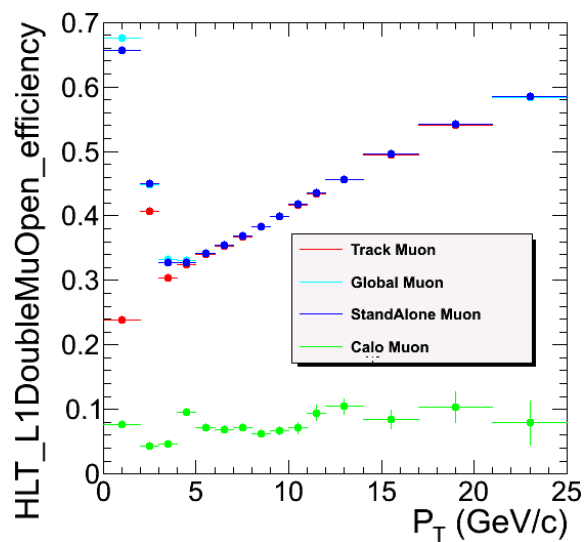
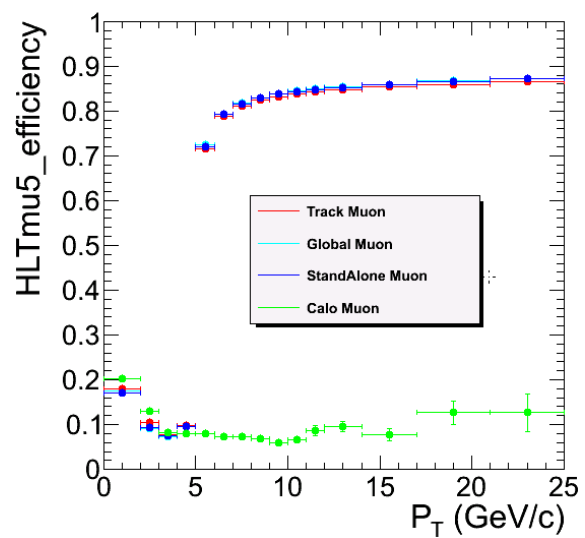
$$\varepsilon_{\text{purity}} = N_{\text{Reco-matched}}(p_t) / N_{\text{Reco}}(P_t)$$

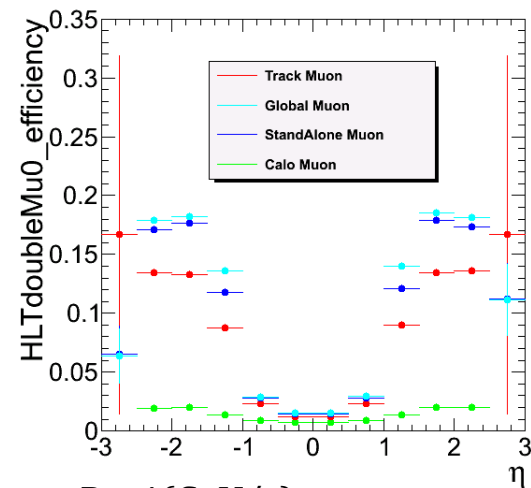
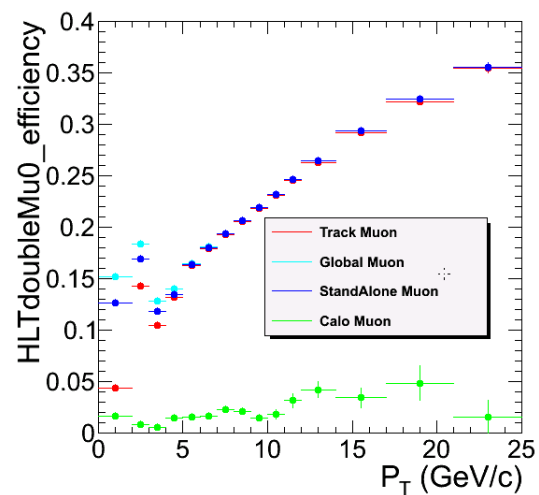
$$\varepsilon_{\text{purity}} = N_{\text{Reco-matched}}(\eta) / N_{\text{Reco}}(\eta)$$

# HLTrigger Efficiency(L=1E31)

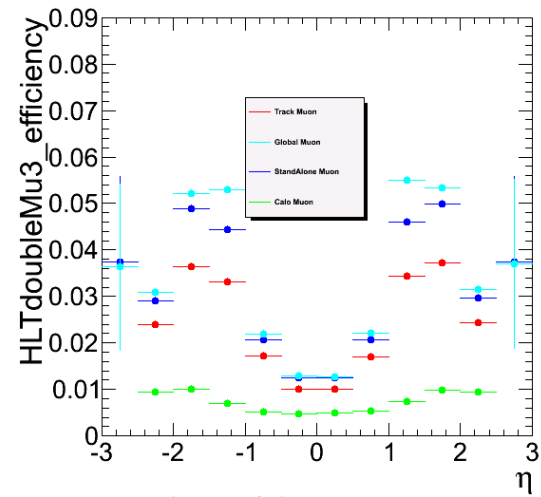
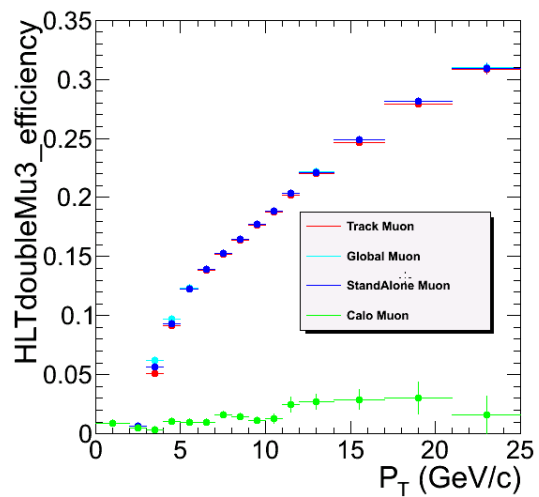


$$\mathcal{E}_{Trigger} = N_{After-trigger}(p_t) / N_{Reco-matched}(P_t)$$



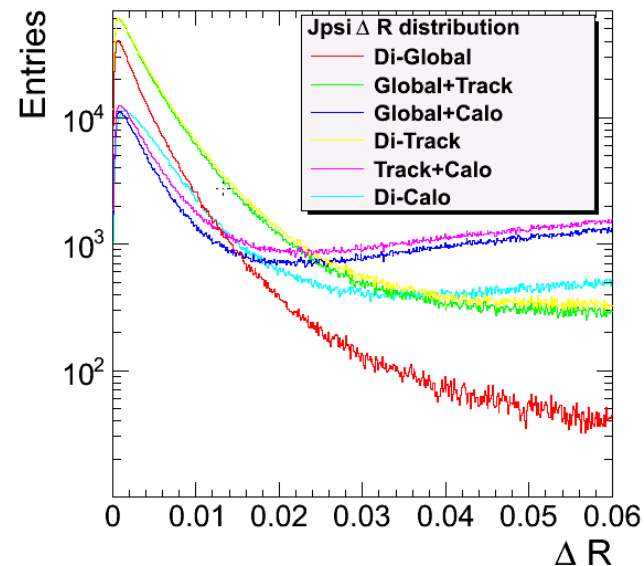
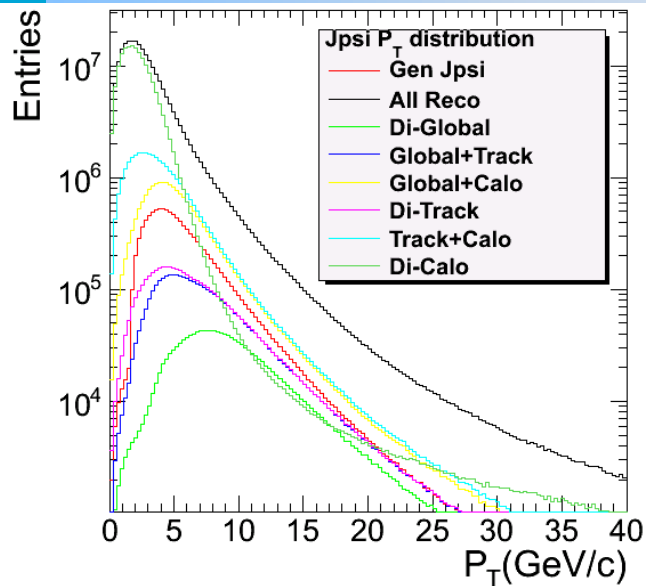
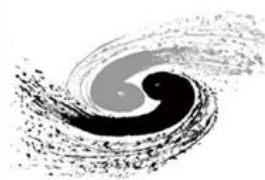


•  $P_t < 4(\text{GeV}/c)$



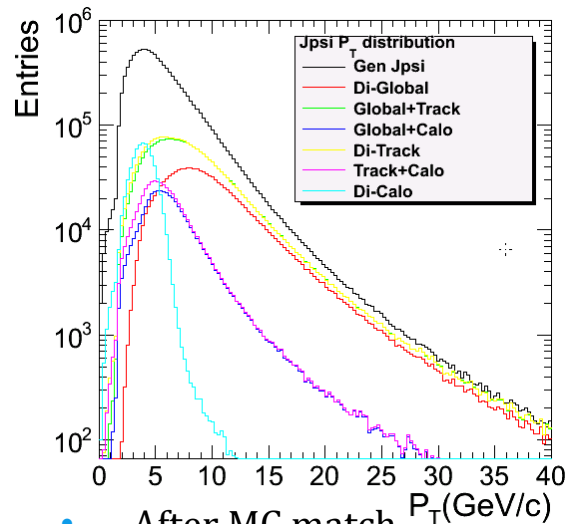
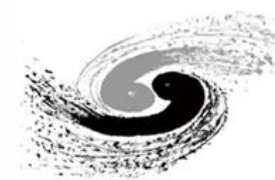
•  $P_t < 4(\text{GeV}/c)$

# Reconstructed Jpsi distribution

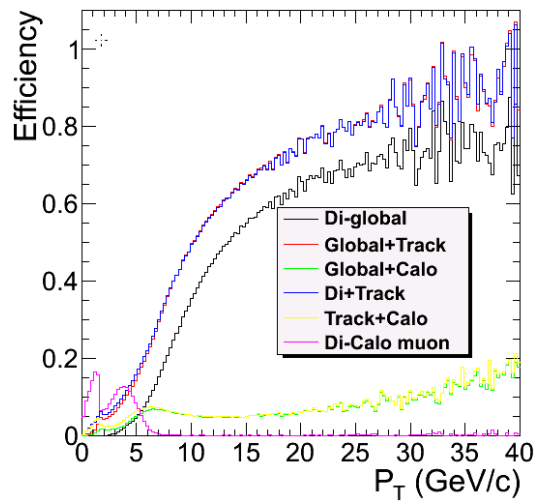


Arbitrary sort of dimuon be reconstructed as jpsi.  
There are too many fake jpsi from the Calo muon.

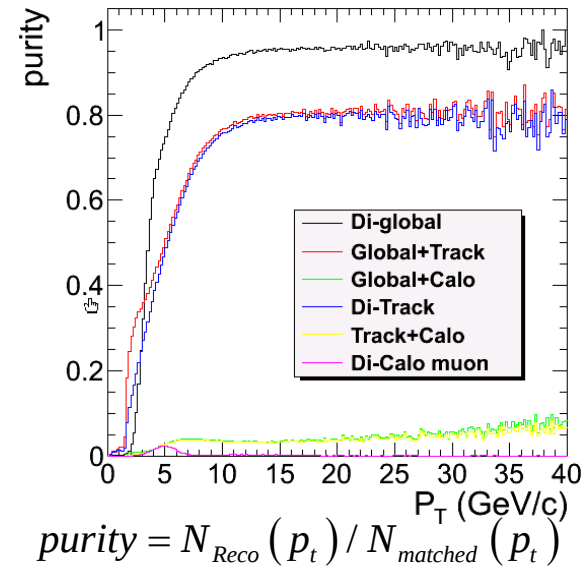
# Efficiency and purity



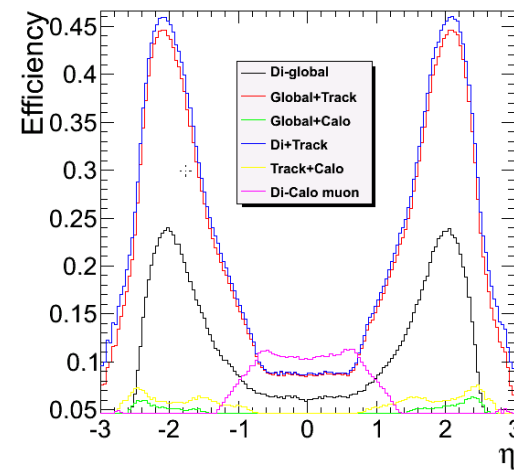
- After MC match



$$\varepsilon_{acc} = N_{Re-matched}(p_t) / N_{Gen}(P_t)$$

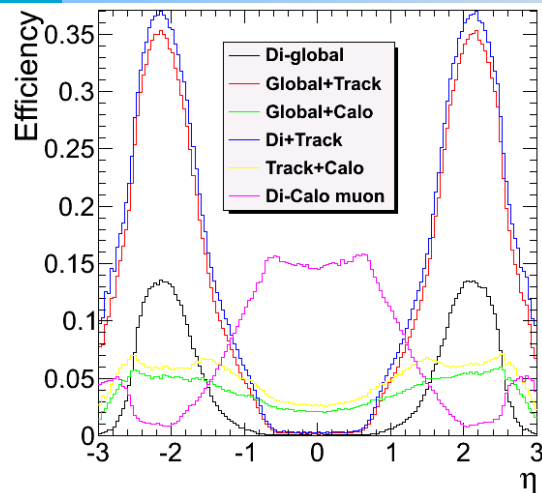
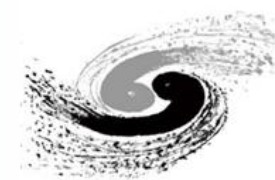


$$purity = N_{Reco}(p_t) / N_{matched}(p_t)$$

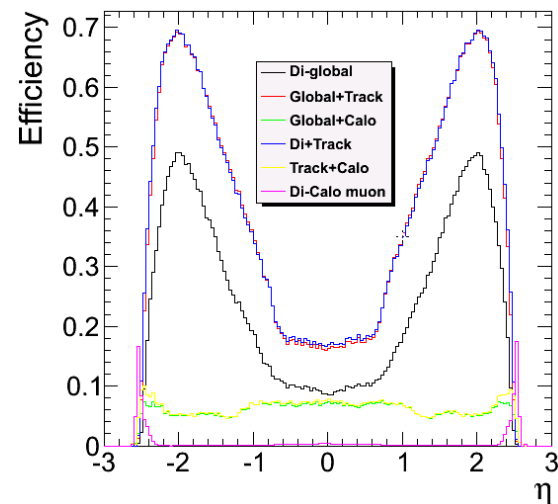


$$\varepsilon_{acc} = N_{Re-matched}(\eta) / N_{Gen}(\eta)$$

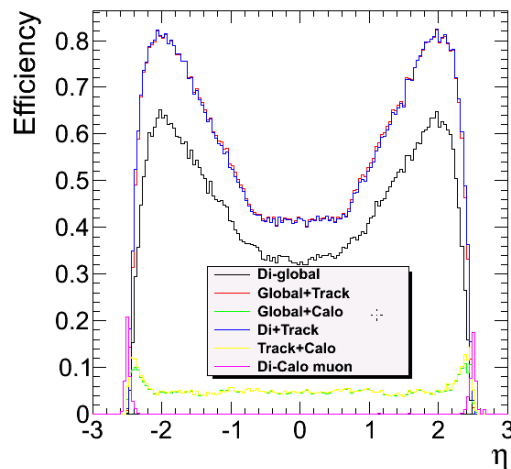
# Different pt bin J/psi efficiency



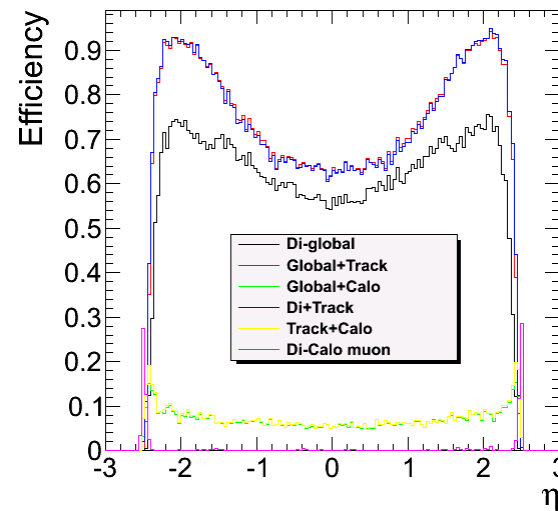
- $Pt < 7 \text{ (GeV/c)}$



- $7 < Pt < 10 \text{ (GeV/c)}$

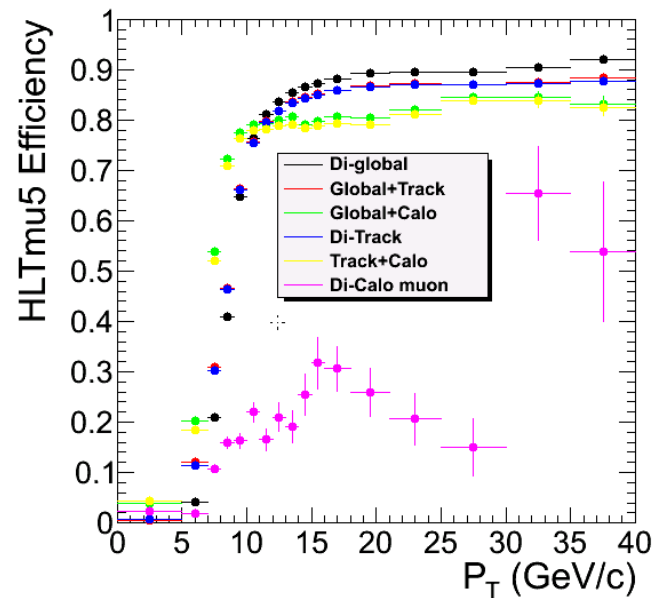
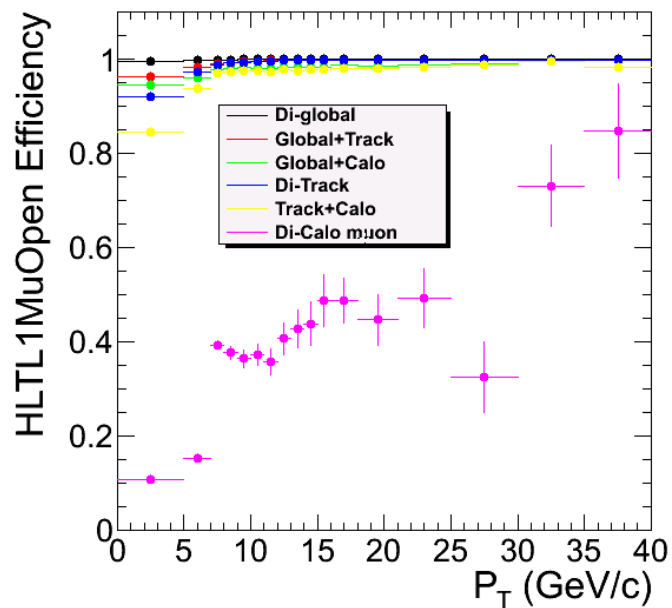
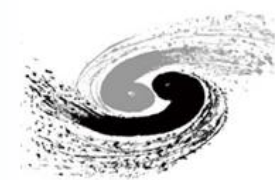


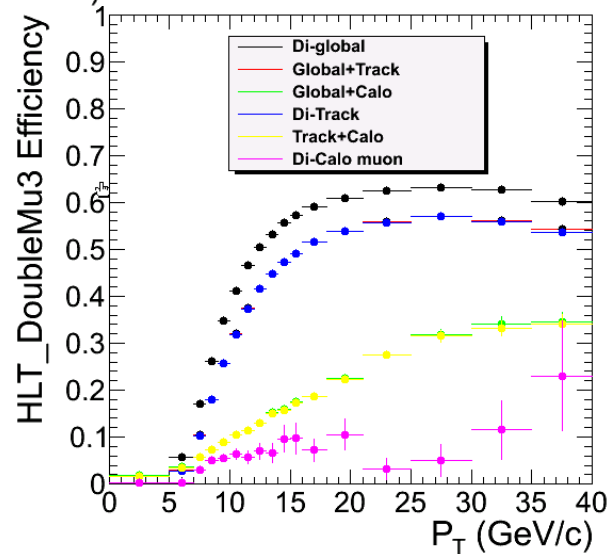
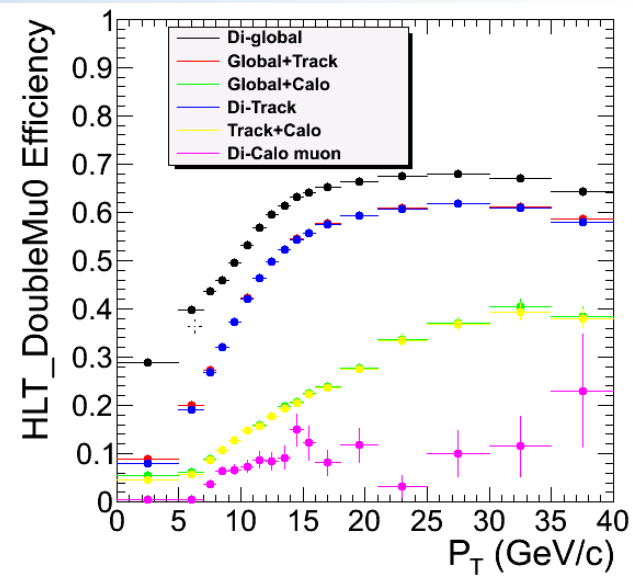
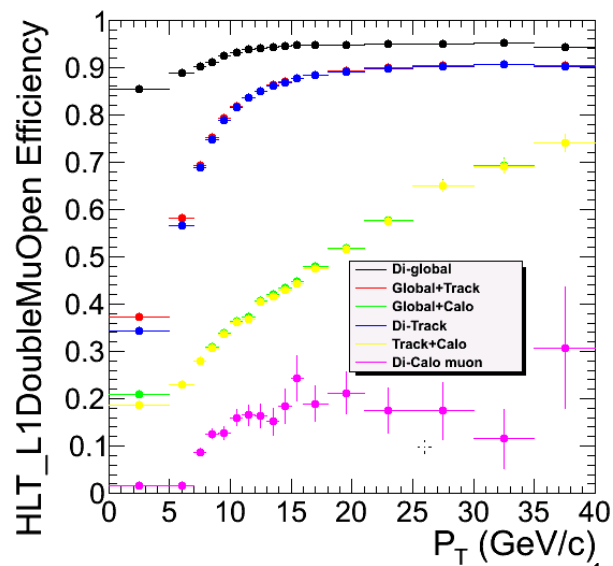
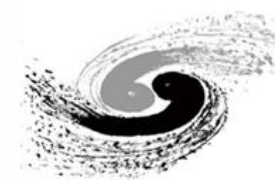
- $10 < Pt < 15 \text{ (GeV/c)}$

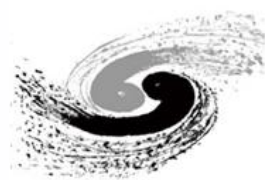


- $Pt > 15 \text{ (GeV/c)}$

# HLTrigger efficiency(L=1E31)







## HLT\_DoubleMu0

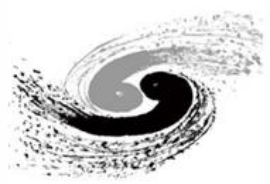
Passed [L1\\_DoubleMuOpen](#)

- A double muon trigger, based on the Level 3 (combined muon system and tracker) HLT muon reconstruction.
- At least two Level 3 muons are required, without any pT cut.
- Each Level 3 muon is seeded by a Level 2 muon, without any pT cut.
- The two-dimensional Delta-XY between each Level 3 muon and the beam spot must be  $< 2$  cm.

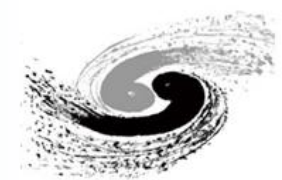
- **HLT\_L1DoubleMuOpen**

- Passed [L1\\_DoubleMuOpen](#)
- A double muon pass-through trigger.
- No selections beyond L1 are required in the HLT.

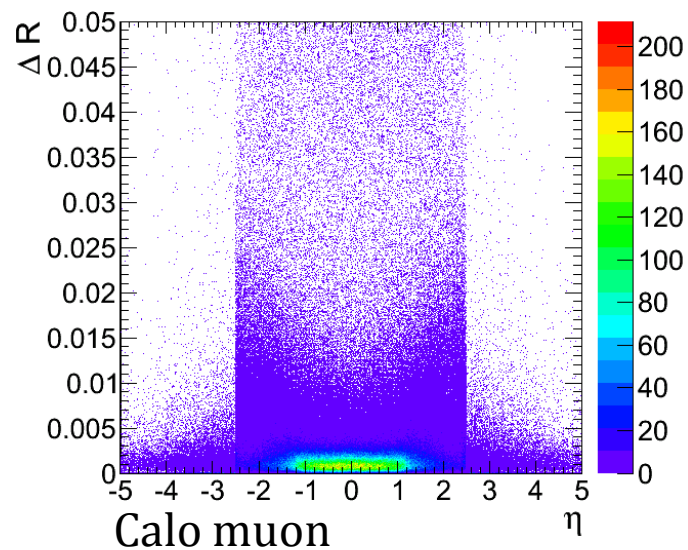
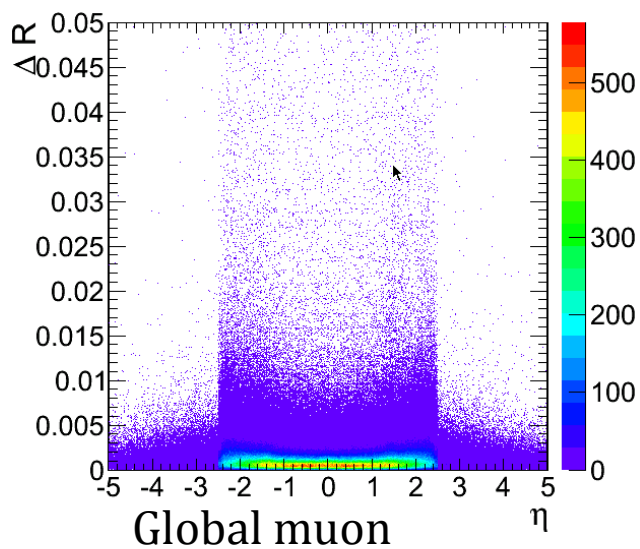
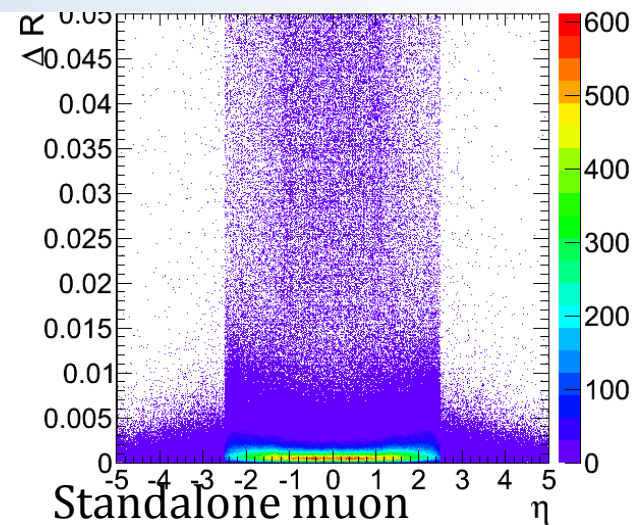
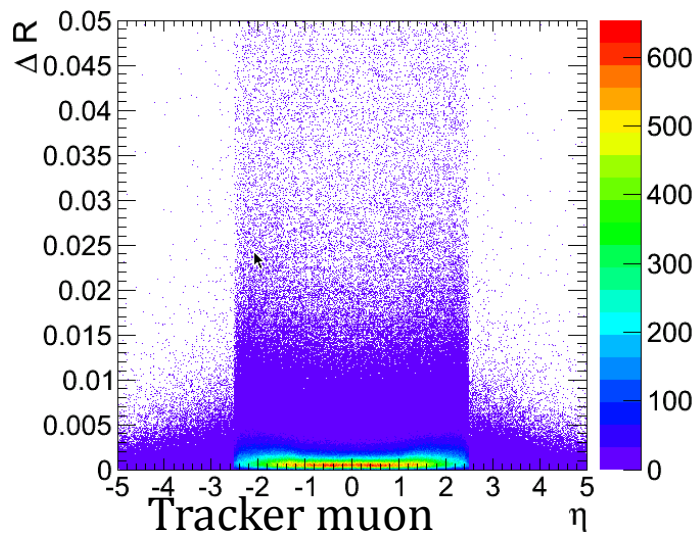
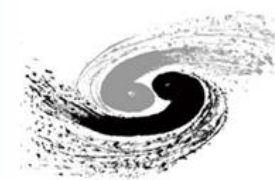
# Next step

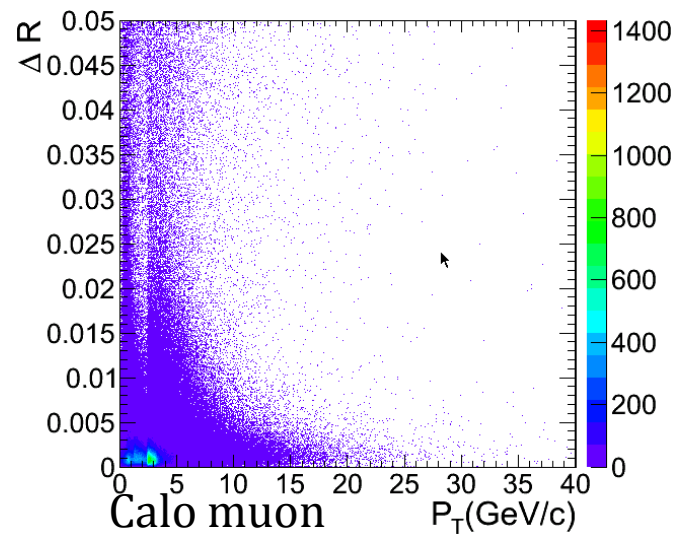
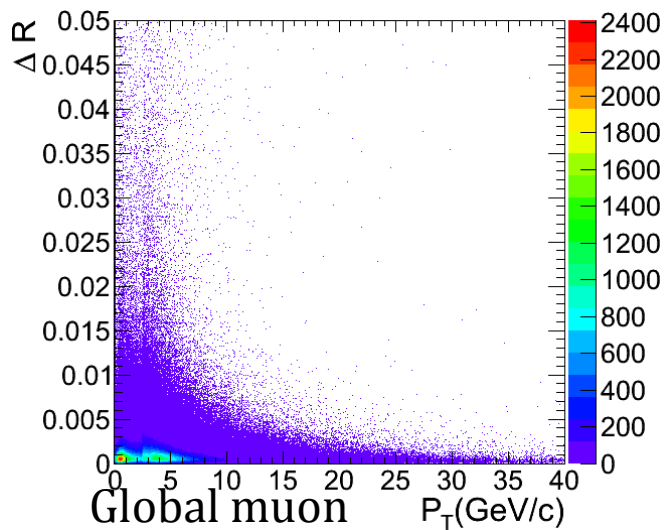
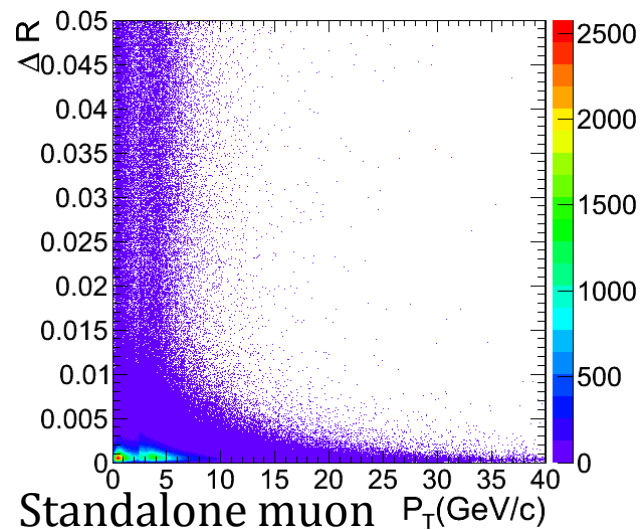
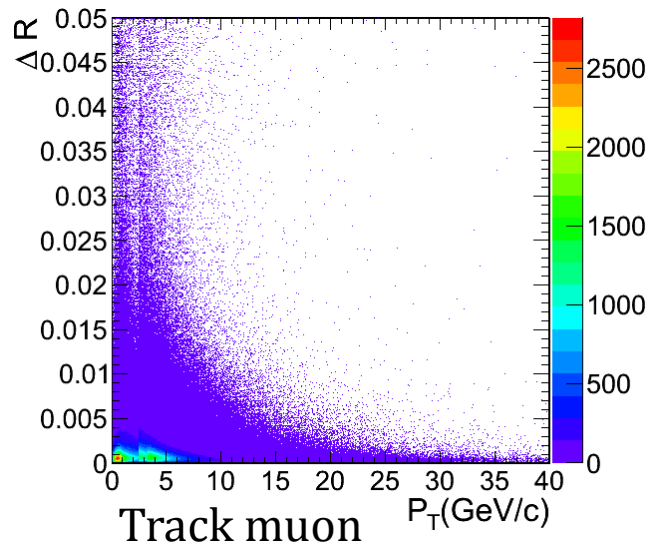
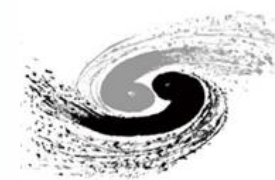


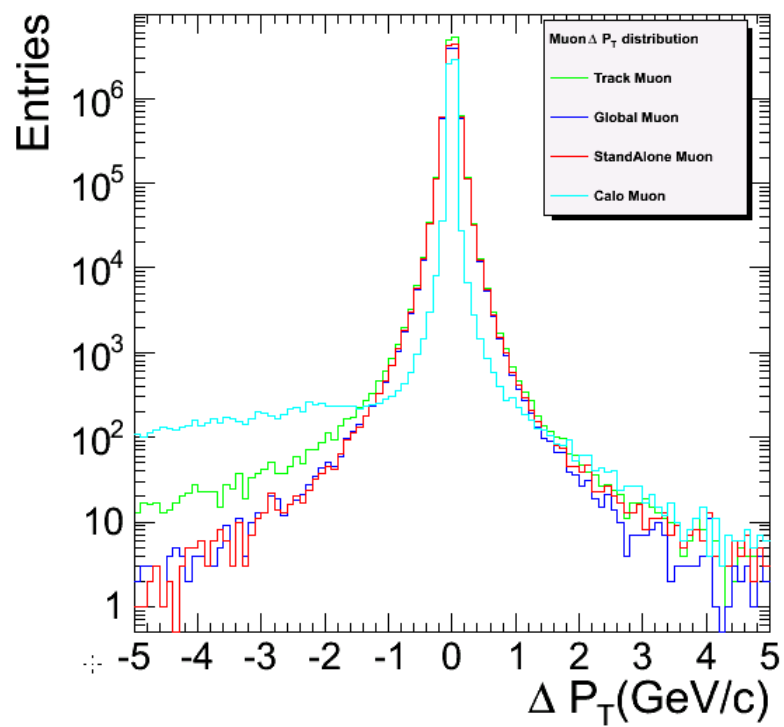
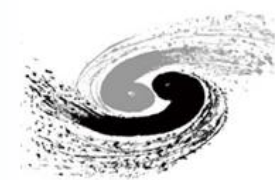
- Jpsi reconstruction efficiency.
- Fit validation.
- Use track muon to analyze  $B_c \rightarrow J/\psi \mu \nu$
- $B_c \rightarrow J/\psi \pi$  analysis.
- Low pt track muon and cola muon analysis in CMSSW\_3\_1\_x.



Thank you!







# $\Delta R$ distribution

