



Presentazione del lavoro di tesi  
“Il trigger dimuonico nell'esperimento ATLAS”  
N.Calace



# Low-pT selection: $J/\psi \rightarrow \mu\mu$

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Selezione sul campione di dati contenenti la statistica del 2010 con luminosità di  $40 \text{ pb}^{-1}$  - due muoni combinati di carica opposta la cui massa invariante sia compresa tra  $[2-4] \text{ GeV}$ .

$n\text{Pixels} > 0$ ,  $n\text{SCT} > 5$ ,  $n\text{TRT} > 10$  (if  $|\eta| < 2$ )

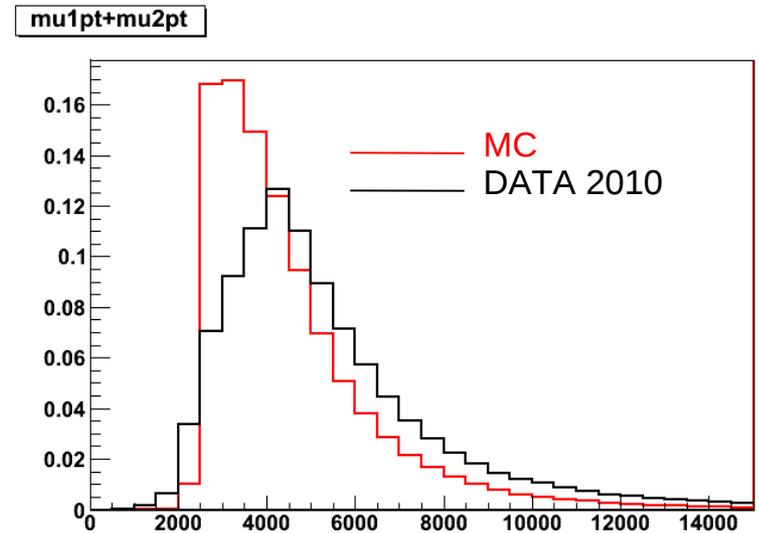
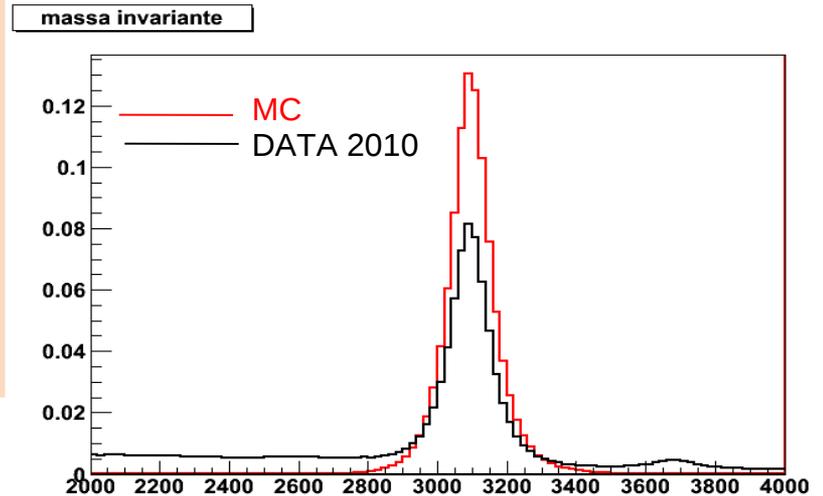
$0.3 < \Delta R(\mu_1\mu_2) < 2.5$

Metodo di Tag&Probe

I muoni di “Tag” sono stati scelta attraverso i seguenti oggetti di trigger:

- EFMU4
- EFMU6

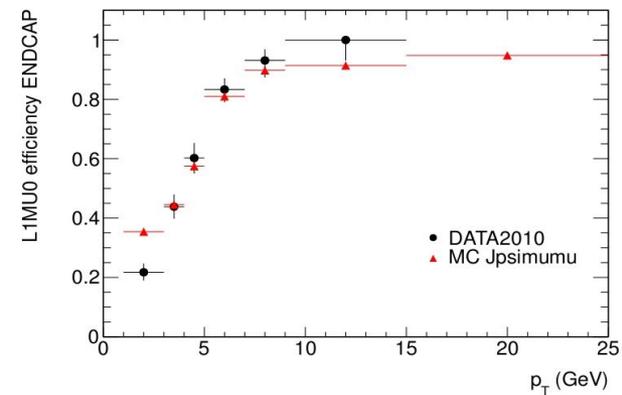
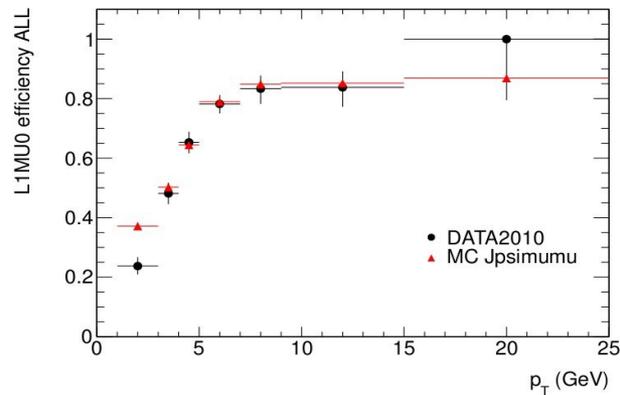
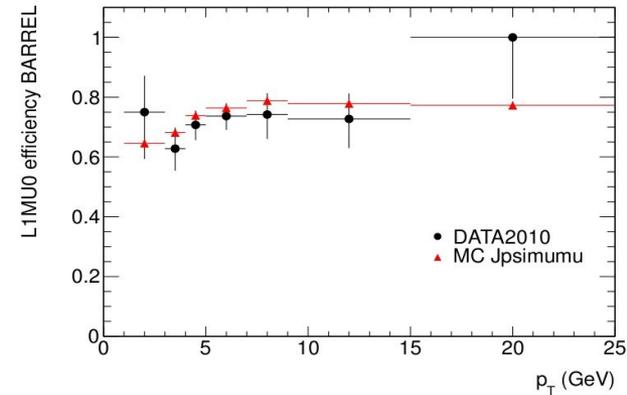
I muoni di “Probe” sono stati usati per testare sia L1 che HLT



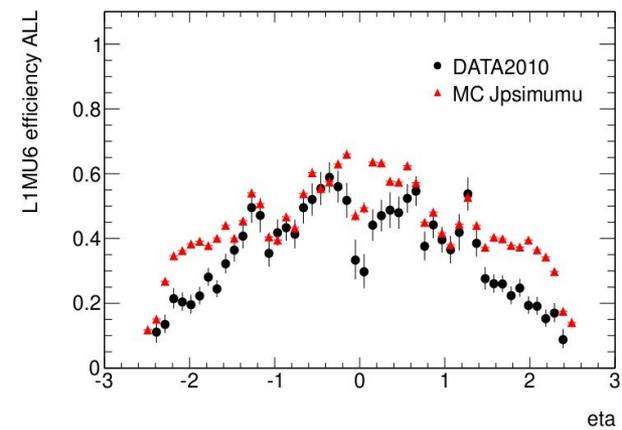
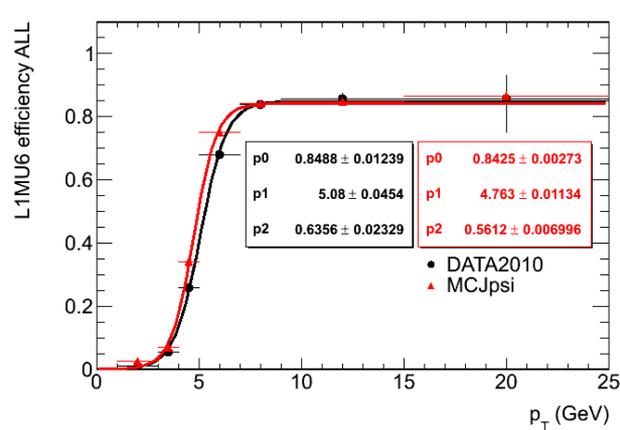
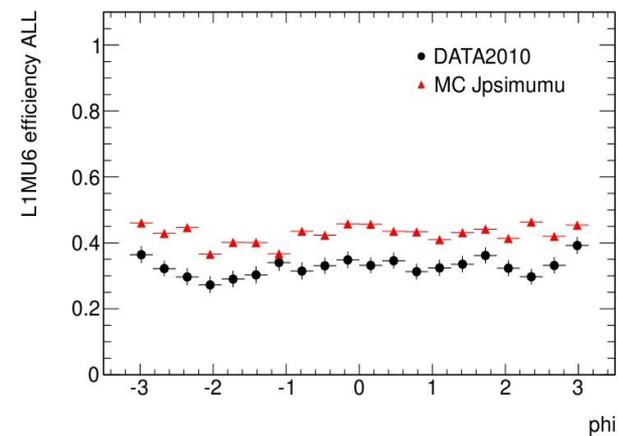
# L1MU0 & L1MU6

## Comparison with MC $J/\psi \rightarrow \mu\mu$

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Efficienza in funzione di  $p_T$ , eta e phi dell'L1MU0 per muoni con  $p_T > 4\text{GeV}$

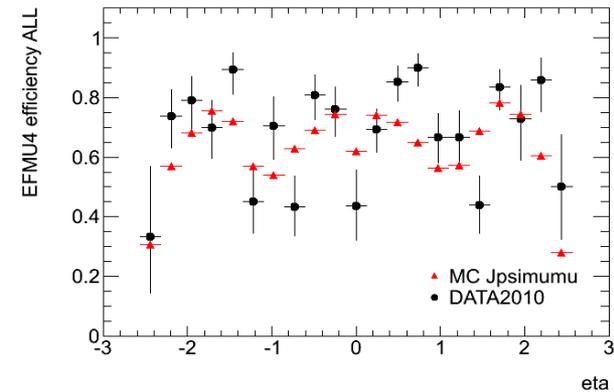
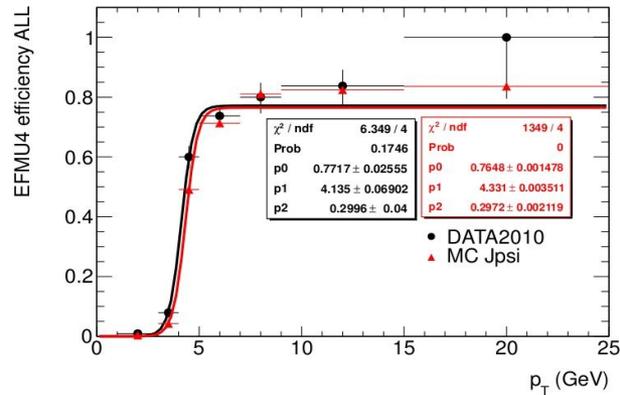
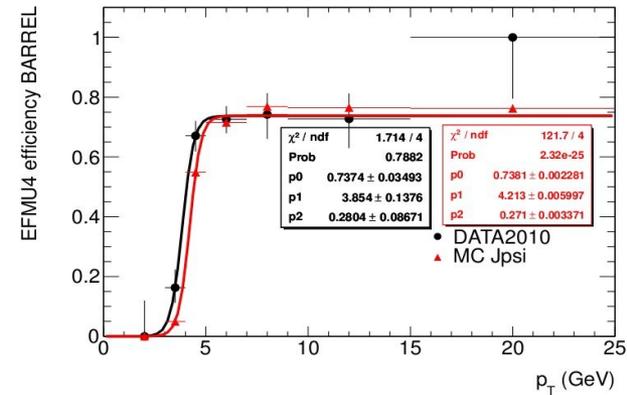


Efficienza in funzione di  $p_T$ , eta e phi dell'L1MU6 per muoni con  $p_T > 6\text{GeV}$

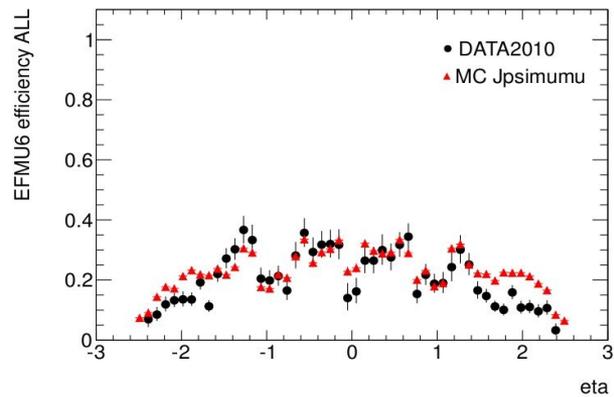
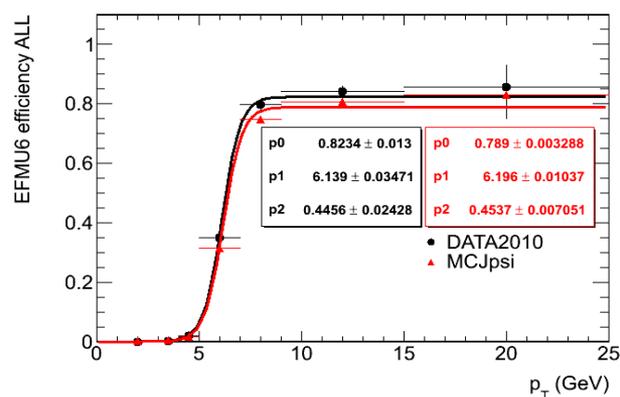
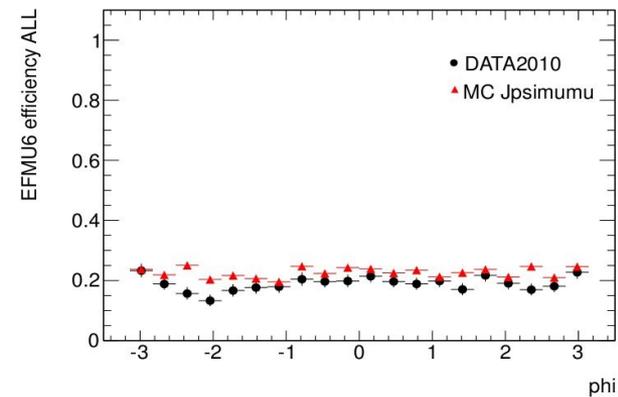
# EFMU4 & EFMU6

## Comparison with MC $J/\psi \rightarrow \mu\mu$

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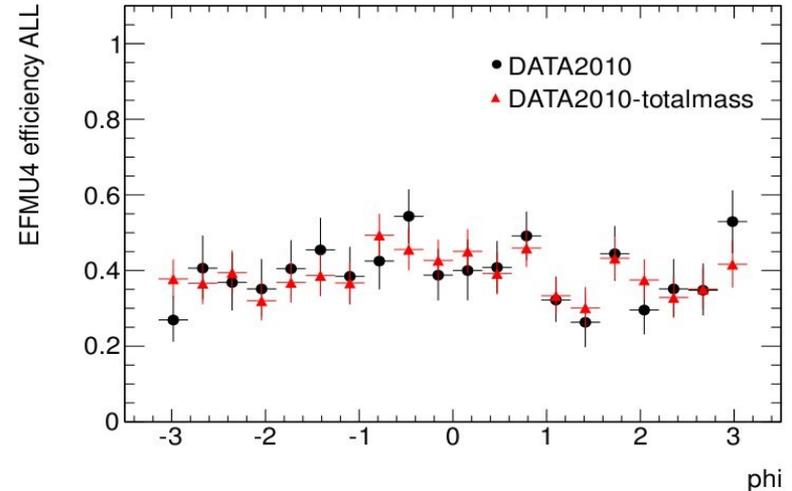
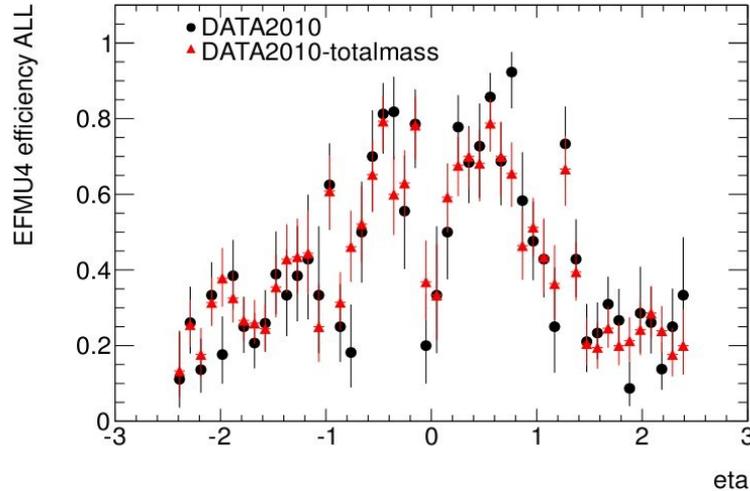
Efficienza in funzione di  $p_T$ , eta e phi dell'EFMU4 per muoni con  $p_T > 4 \text{ GeV}$



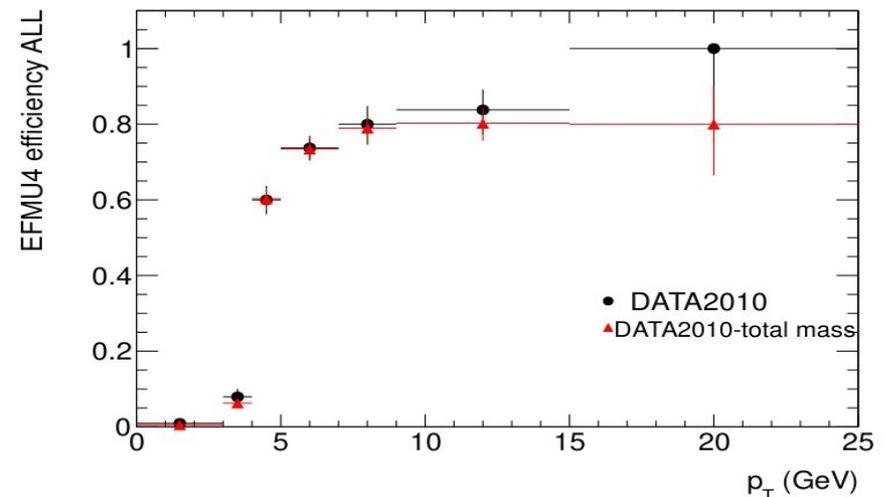
Efficienza in funzione di  $p_T$ , eta e phi dell'EFMU6 per muoni con  $p_T > 6 \text{ GeV}$

# EFMU4 : Confronto DATI per diversi range della massa invariante

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Efficienza in funzione di  $p_T$ , eta e phi dell'EFMU4 per muoni con  $p_T > 4 \text{ GeV}$ . Confronto tra l'efficienza ottenuta dai DATI relativi all'intervallo della massa invariante  $[2;4] \text{ GeV}$  e quella ottenuta considerando l'intero spettro.



# Low-pT RESULTS

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	DATA BARREL	MC BARREL	DATA ENDCAP	MC ENDCAP	DATA ALL	MC ALL
L1MU6	(77±2)%	(77,2±0,4)%	(91±1) %	(90,0±0,3)%	(85±1)%	(84,2±0,3)%
EFMU4	(74±3)%	(73,8±0,2)%	(84±3)%	(79,5±0,2)%	(77±3)%	(76,5±0,1)%
EFMU6	(77±2)%	(72,7±0,5)%	(87±1)%	(83,7±0,3)%	(82±1)%	(78,9±0,3)%

# High- $p_T$ selection: $Z \rightarrow \mu\mu$

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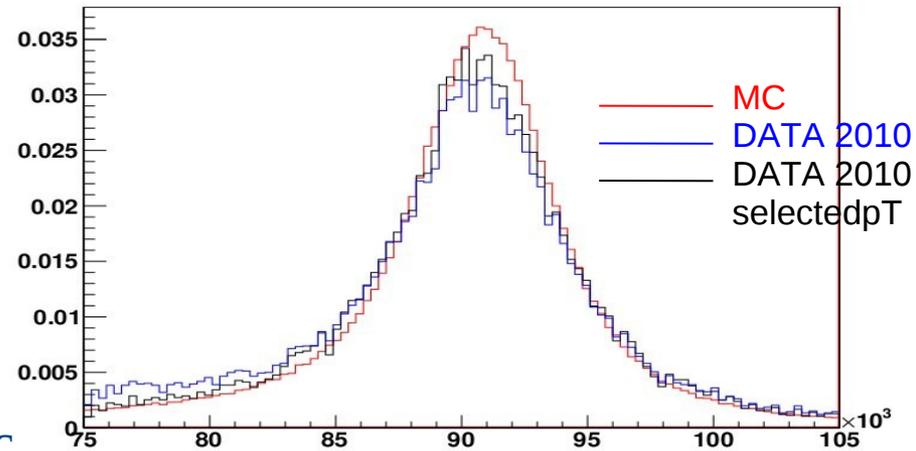
Selezione sul campione di dati contenenti la statistica del 2010 con luminosità di  $40 \text{ pb}^{-1}$  - due muoni combinati di carica opposta la cui massa invariante sia compresa tra  $[80;100] \text{ GeV}$ .

$n_{\text{Pixels}} > 0$ ,  $n_{\text{SCT}} > 5$ ,  $n_{\text{TRT}} > 10$  (if  $|\eta| < 2$ )

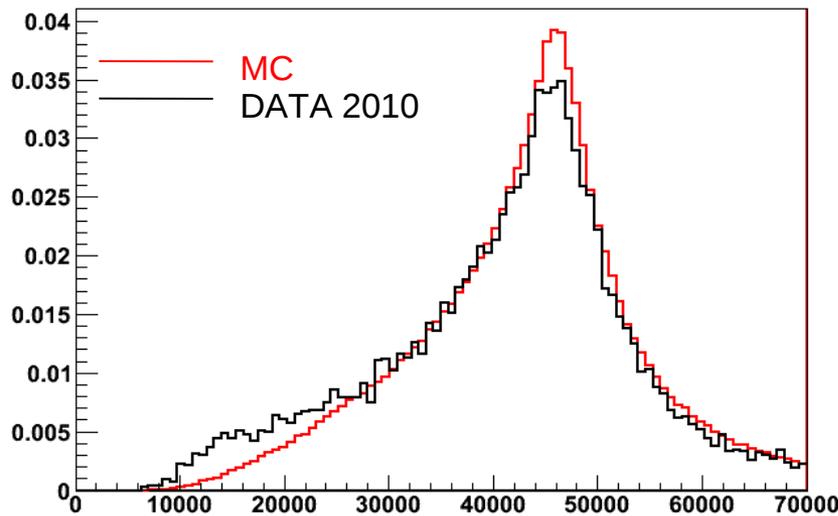
Isolation cut:  $p_{T\text{cone40}}/p_T < 0.2$

Selezione in  $p_T$ :  $\mu_1 p_T > 14 \text{ GeV}/c$  e  $\mu_2 p_T > 22 \text{ GeV}/c$

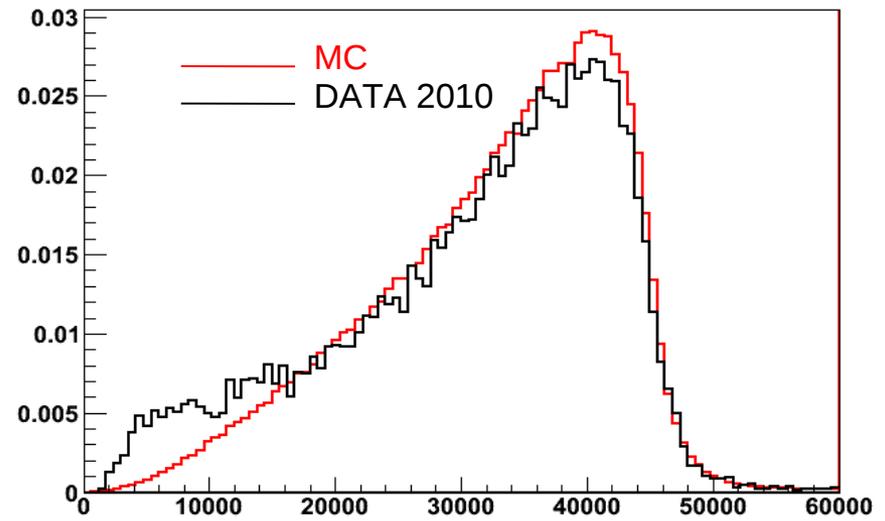
massa invariante



mu2pt



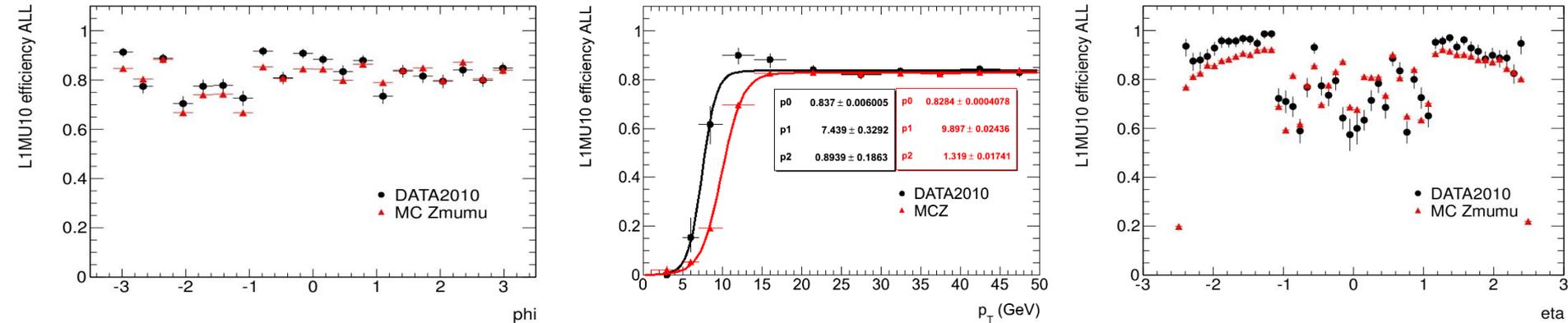
mu1pt



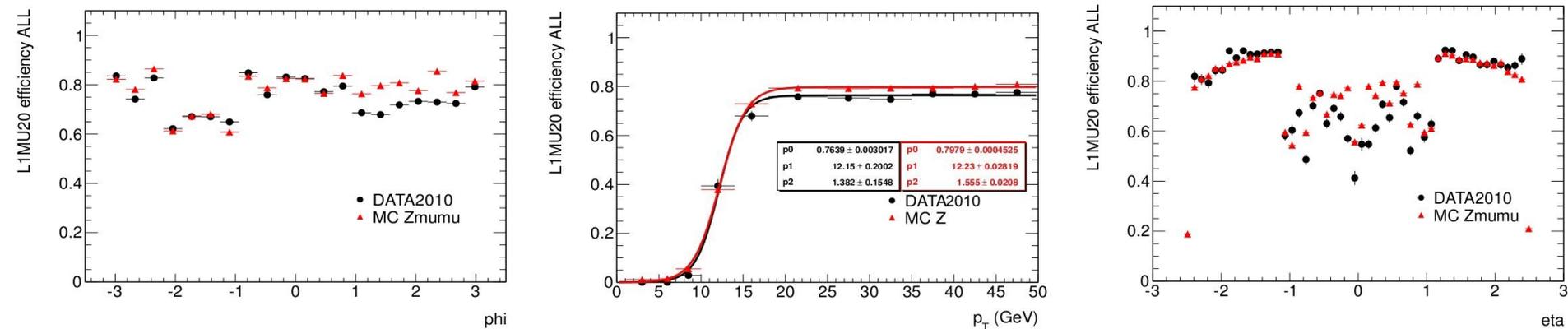
# L1MU10 & L1MU20

## Comparison with MC $Z \rightarrow \mu\mu$

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Efficienza in funzione di  $p_T$ , eta e phi dell'L1MU10 per muoni con  $p_T > 10 \text{ GeV}$

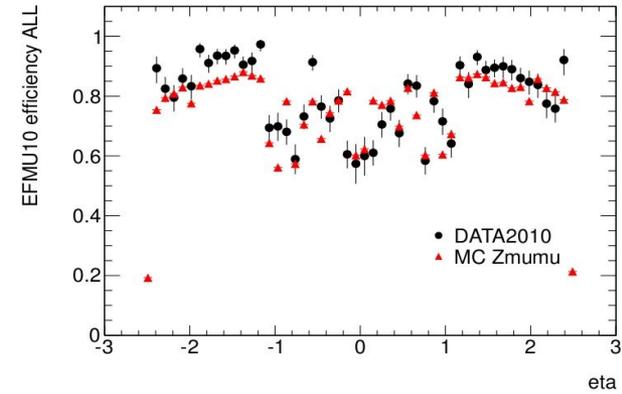
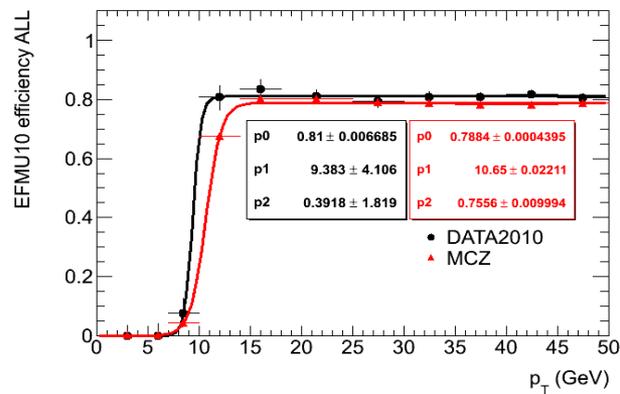
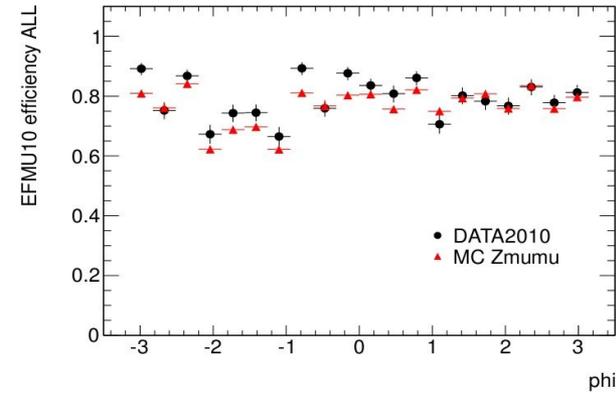


Efficienza in funzione di  $p_T$ , eta e phi dell'L1MU20 per muoni con  $p_T > 20 \text{ GeV}$

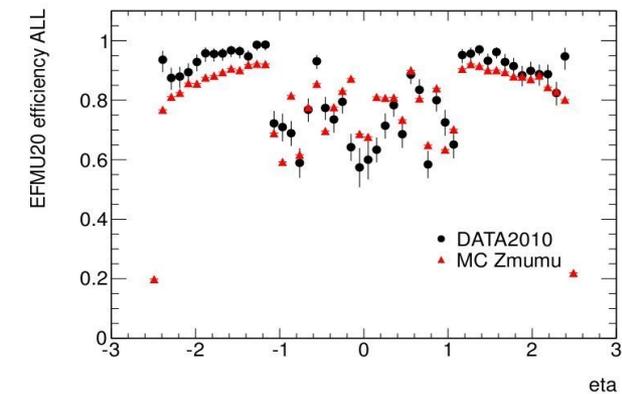
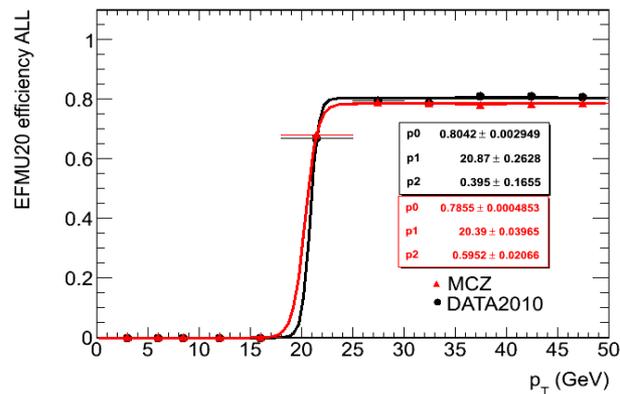
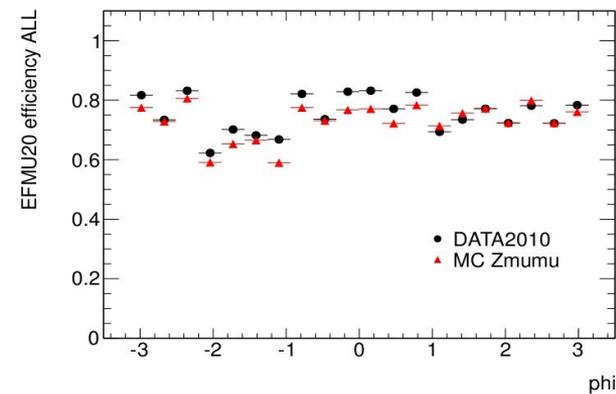
# EFMU10 & EFMU20

## Comparison with MC $Z \rightarrow \mu\mu$

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Efficienza in funzione di  $p_T$ , eta e phi dell'EFMU10 per muoni con  $p_T > 10 \text{ GeV}$



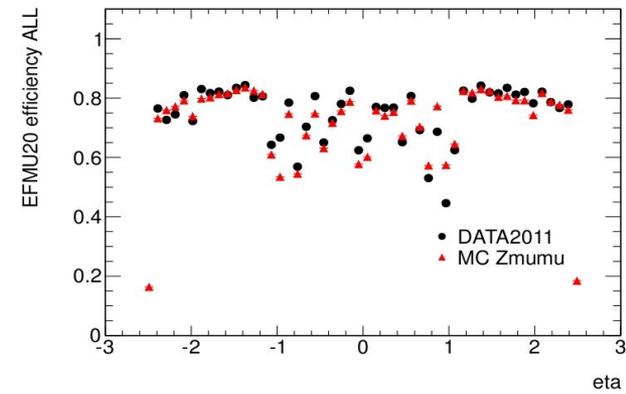
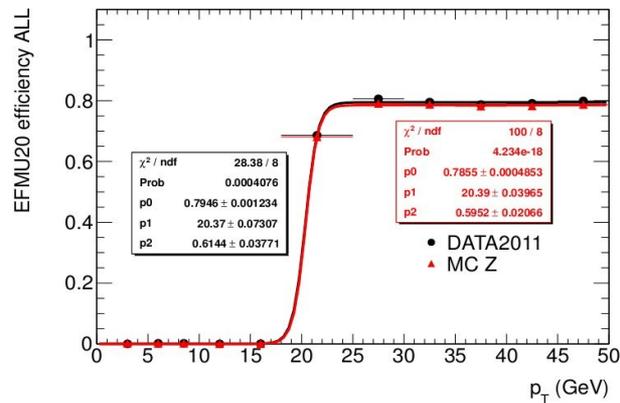
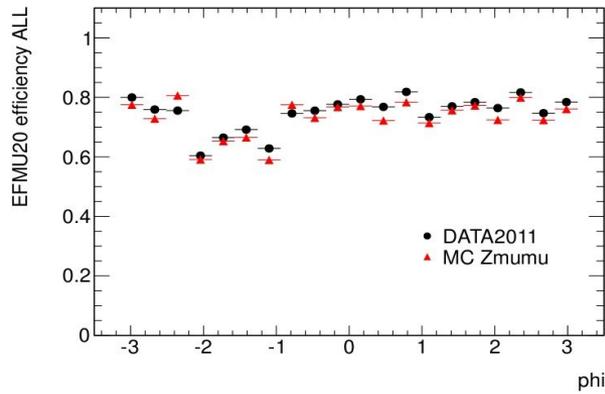
Efficienza in funzione di  $p_T$ , eta e phi dell'EFMU20 per muoni con  $p_T > 20 \text{ GeV}$

# EFMU20: DATI periodo G 2011

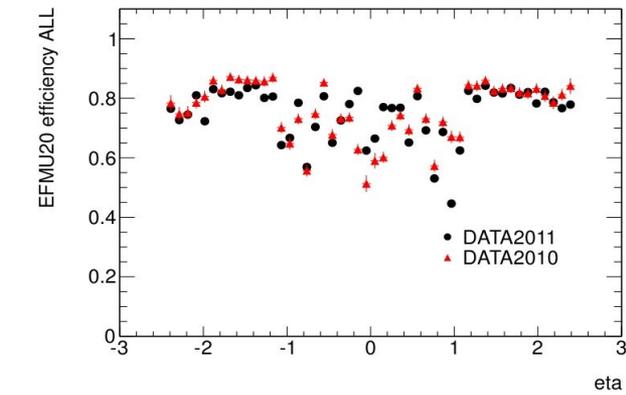
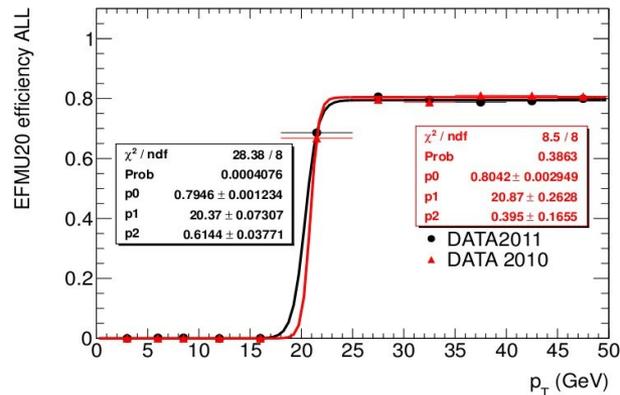
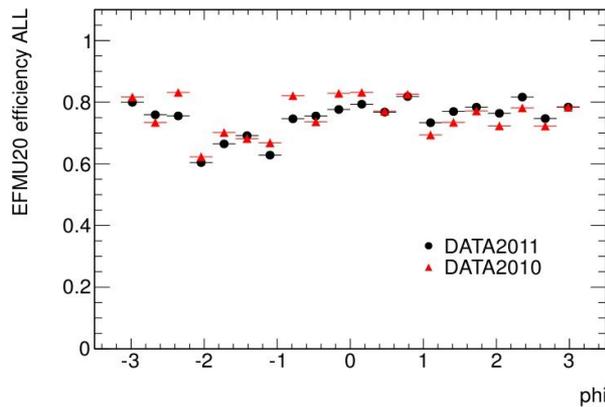
## Comparison with MC $Z \rightarrow \mu\mu$ e dati del 2010

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Efficienza in funzione di  $p_T$ , eta e phi dell'EFMU20 per muoni con  $p_T > 20\text{GeV}$   
Confronto DATI 2011 vs MC



## Confronto DATI 2011 vs DATI 2010



# High-pT RESULTS 2010

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	DATA BARREL	MC BARREL	DATA ENDCAP	MC ENDCAP	DATA ALL	MC ALL
L1MU10	73±1%	76,9±0,1%	94,7±0,5%	88,6±0,1%	83,7±0,6%	82,8±0,1%
L1MU20	63,4±0,4%	71,7±0,1%	91,2±0,2%	87,9±0,1%	76,4±0,3%	79,8±0,1%
EFMU10	71±1%	72,7±0,1%	91,1±0,7%	84,7±0,1%	81,0±0,7%	78,8±0,1%
EFMU20	71,5±0,5%	72,6±0,1%	90,7±0,3%	84,6±0,1%	80,4±0,2%	78,5±0,1%

# High-pT RESULTS 2011

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DATA  
BARREL

MC  
BARREL

DATA  
ENDCAP

MC  
ENDCAP

DATA  
ALL

MC  
ALL

EFMU20

$72,3 \pm 0,2\%$

$72,56 \pm 0,07\%$

$87,3 \pm 0,1\%$

$84,63 \pm 0,06\%$

$79,5 \pm 0,1\%$

$78,55 \pm 0,05\%$

# To do...

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utilizzare i risultati ottenuti per valutare l'efficienza del trigger dimuonico sia per i dati del 2010 che per quelli del 2011