Preliminary Look at Period 13 High PT Lepton Efficiencies and SF

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Tufts

Electrons ID: Samples

Dataset bhelmj: Runs 241665-246231
MC sample : zemtef (zewkef June 2007)
GRL :MC GRL Preliminary for Period 13
(http://www-cdf.fnal.gov/internal/dqm/goodrun/good.html)

Looked at ~350 files (as of Nov 28 2007) on SAM, processed 127 (lost kerberos ticket!)

Many Thanks to Daryl Hare!

Electron ID: Cuts

CEM Selection Cuts

Variable	Tight (CEM)
Region	== CEM
Fiducial	Fiducial == 1
E_T	$\geq$ 20 GeV
Track Z_0	$\leq$ 60 cm
Track p_T	$\geq$ 10 GeV/c
COT Ax. Seg.	≥ 3
COT St. Seg.	≥ 2
Conversion	$\neq 1$
Had/em	$\leq (0.055 + (0.00045 \times E))$
Isolation	≤ 0.1
LshrTrk	≤ 0.2
E/P	$\leq$ 2.0 unless $p_T \geq$ 50GeV/c
CES ΔZ	$\leq$ 3.0 cm
Signed CES ΔX	$-3.0 \leq q \times \Delta X \leq 1.5$
CES StripChi2	≤ 10.0

Plug Selection Cuts

Variable	PHX	PEM
E_T	$\geq$ 20GeV	$\geq$ 20GeV
Pes2dEta	$1.2 \leq \lvert\eta\rvert \leq 2.8$	$1.2 \leq \lvert\eta\rvert \leq 2.8$
Had/Em	≤ 0.05	≤ 0.05
Pem3x3FitTow	$\neq 0$	$\neq 0$
Pem3x3Chisq	≤ 10	≤ 10
Pes5by9U	≥ 0.65	≥ 0.65
Pes5by9V	≥ 0.65	≥ 0.65
Isolation	≤ 0.1	≤ 0.1
ΔR	$\leq$ 3.0 cm	$\leq$ 3.0 cm
PhxMatch	TRUE	-
N_{hits}^{Si}	≥ 3	-
$\lvert z_0^{PHX} \rvert$	$\leq$ 60 cm	-

Results for Period 13 (vs P12)

	Period 12		Period 13	
	Bhelmi(P12)	zewkeh	Bhelmi(P13)	zewkeh
CEM Eff	0.7717+\-0.0052	0.8027 +\-0.0011	0.779+\-0.006	0.800 +\-0.001
CEM SF	0.9613 +\-0.007	N/A	0.974 +\-0.008	N/A
nisoCEM Eff	0.8051 +\-0.0049	0.8286 +\-0.0011	0.810 +\-0.006	0.827 +\-0.001
nisoCEM SF	0.9716 +\-0.006	N/A	0.979 +\-0.007	N/A
LooseCEM Eff	0.9018 +/- 0.0037	0.9136 +\-0.0011	0.913 +/- 0.004	0.911 +\-0.001
LooseCEM SF	0.9869 +\-0.004	N/A	1.001 +\-0.005	N/A
nisolooseCEM Eff	0.9401+\-0.0029	0.9452 +\-0.0011	0.949+\-0.003	0.945 +\-0.001
nisoloostCEM SF	0.9945 +\-0.0033	N/A	1.005 +\-0.004	N/A

	PHX		PHX	
Eff |Eta| < 2.0	0.7016+\-0.008	0.7460+\-0.0015	0.600+\-0.010	0.750+\-0.0015
SF |Eta| < 2.0	0.9280+\- 0.0100	NA	0.801+\- 0.008	NA
	PHX		PHX	
Eff |Eta| < 2.8	0.6155+\-0.0066	0.6589+\-0.0015	0.532+\-0.008	0.653+\-0.001
SF |Eta| < 2.8	0.9340+\- 0.0102	NA	0.814+\- 0.013	NA

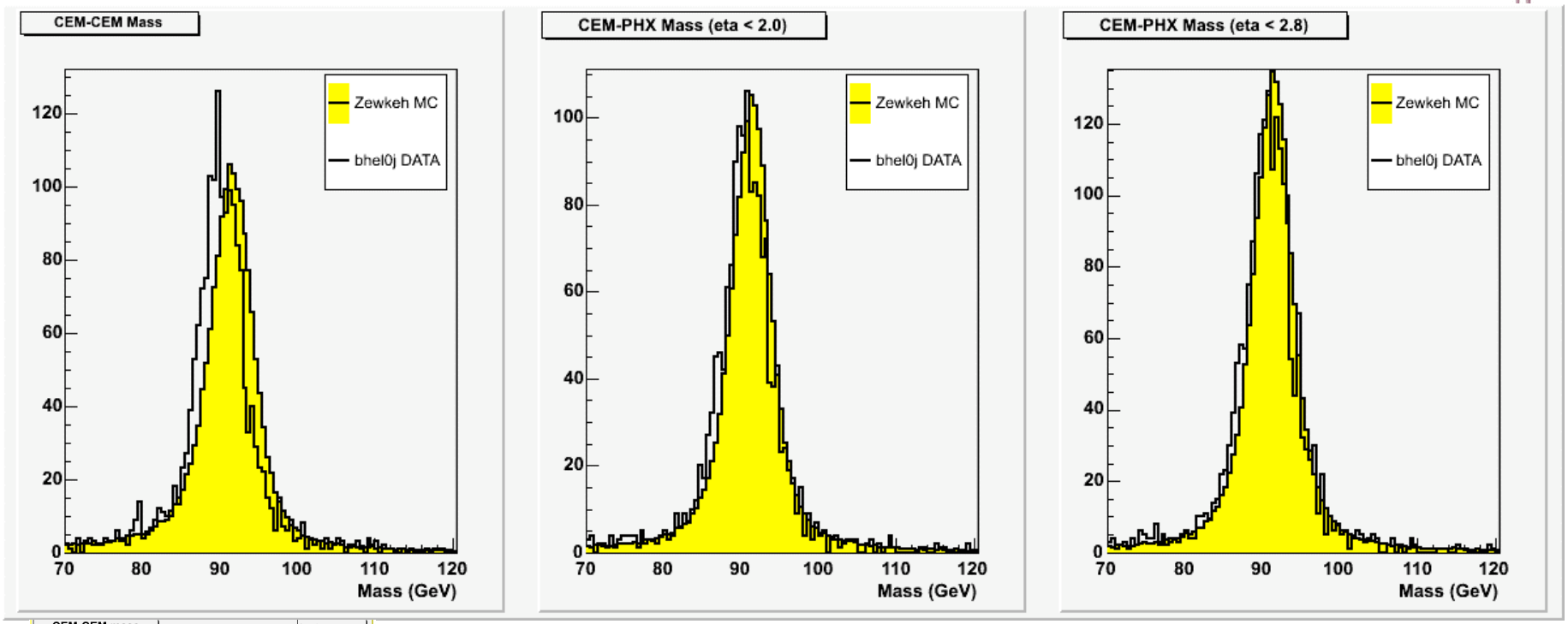
P13 CEM-PEM

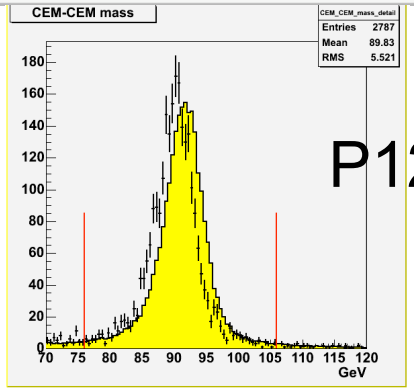
	P12		P13	
	PEM		PEM	
Eff |Eta| < 2.0	0.8001 +\- 0.0065	0.8609 +\- 0.0012	0.803+\-0.008	0.857+\-0.001
SF |Eta| < 2.0	0.9294+\- 0.0077	NA	0.938+\- 0.009	NA

	PEM		PEM	
Eff |Eta| < 2.8	0.7632 +\- 0.0058	0.8297 +\- 0.011	0.764+\-0.007	0.824+\-0.001
SF |Eta| < 2.8	0.9198 +\- 0.007	NA	0.928+\- 0.009	NA

So the drop only concerns Si PHX

EleID Plots

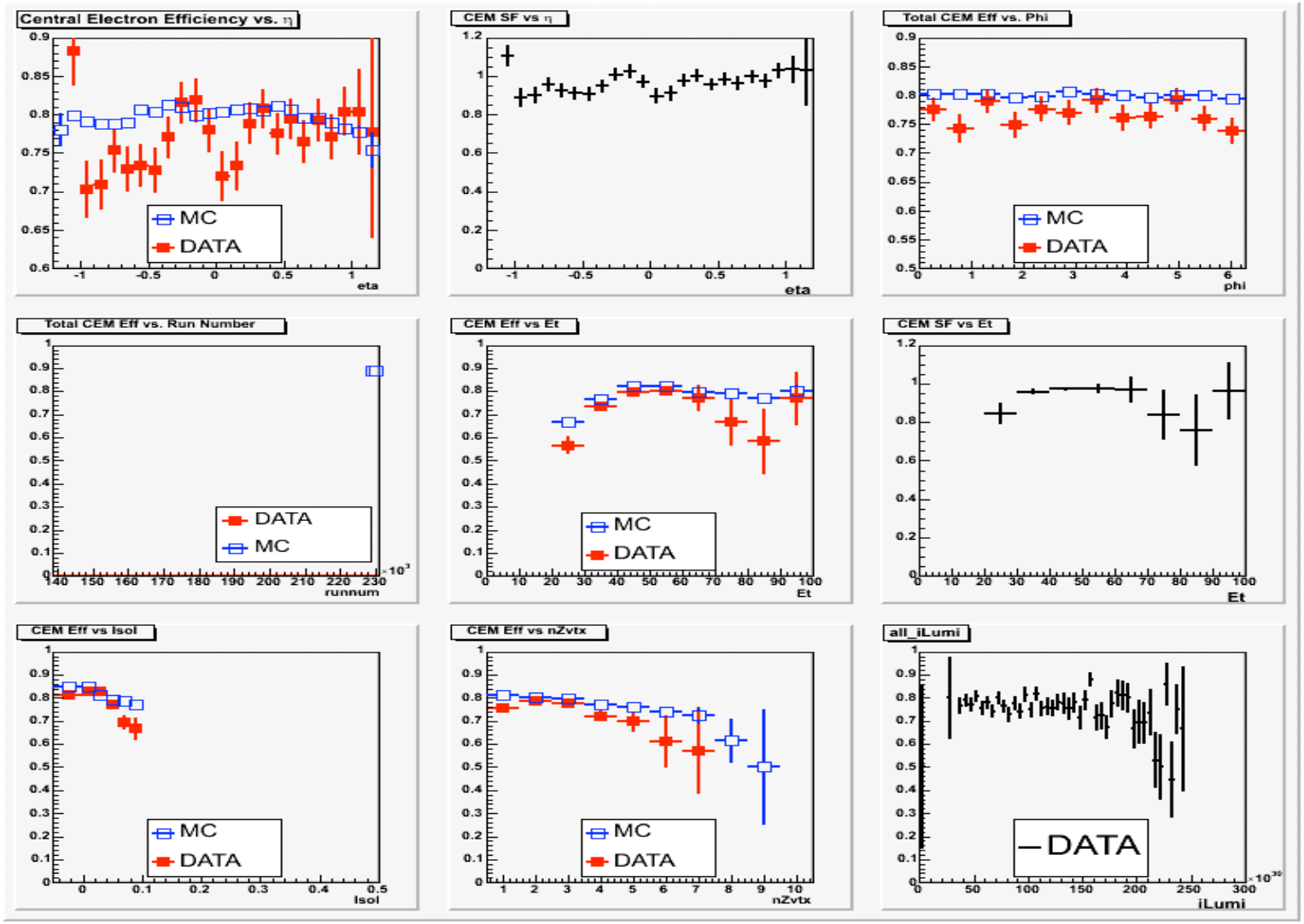




P12

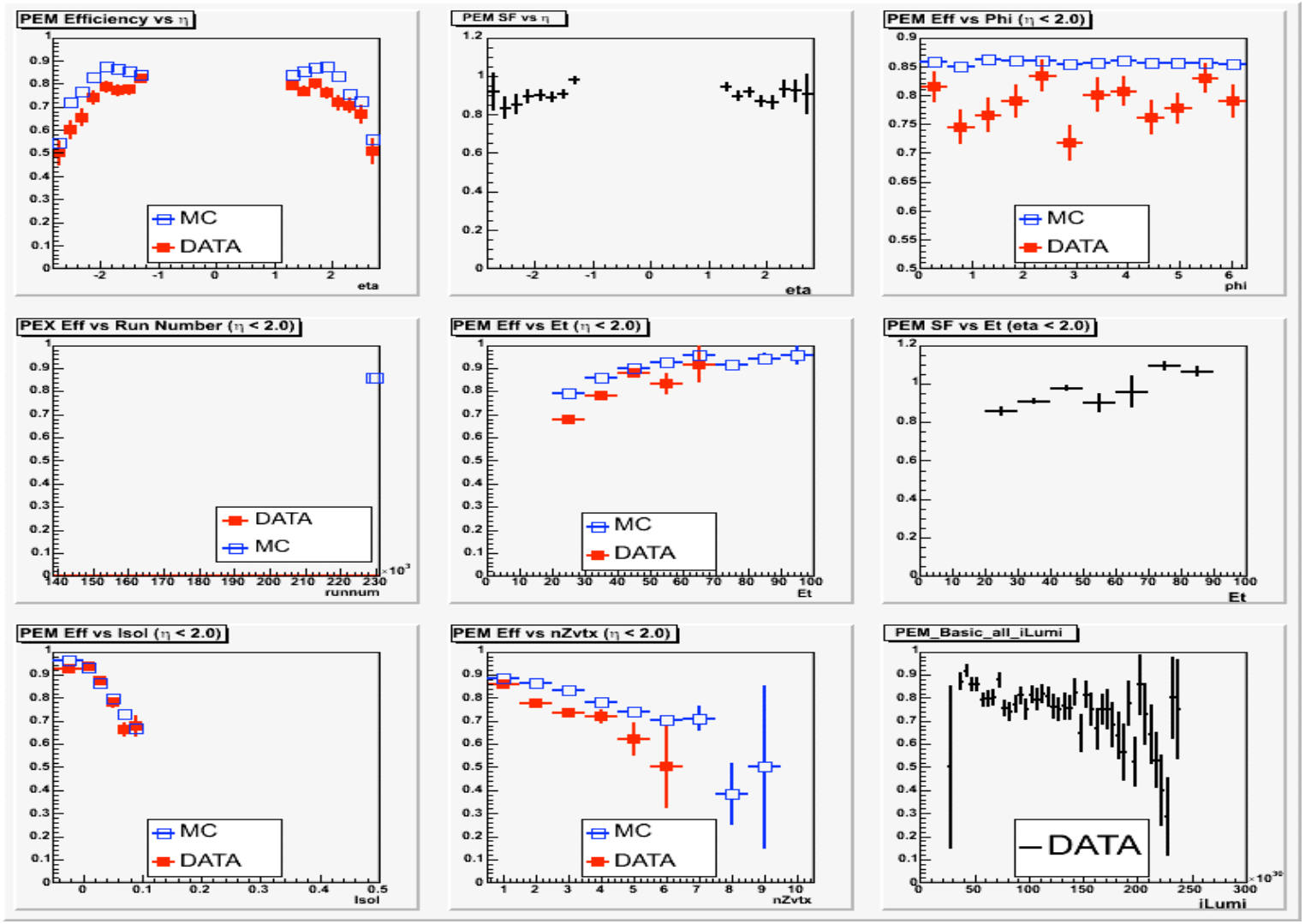
EleID Plots 1

CEM Efficiencies



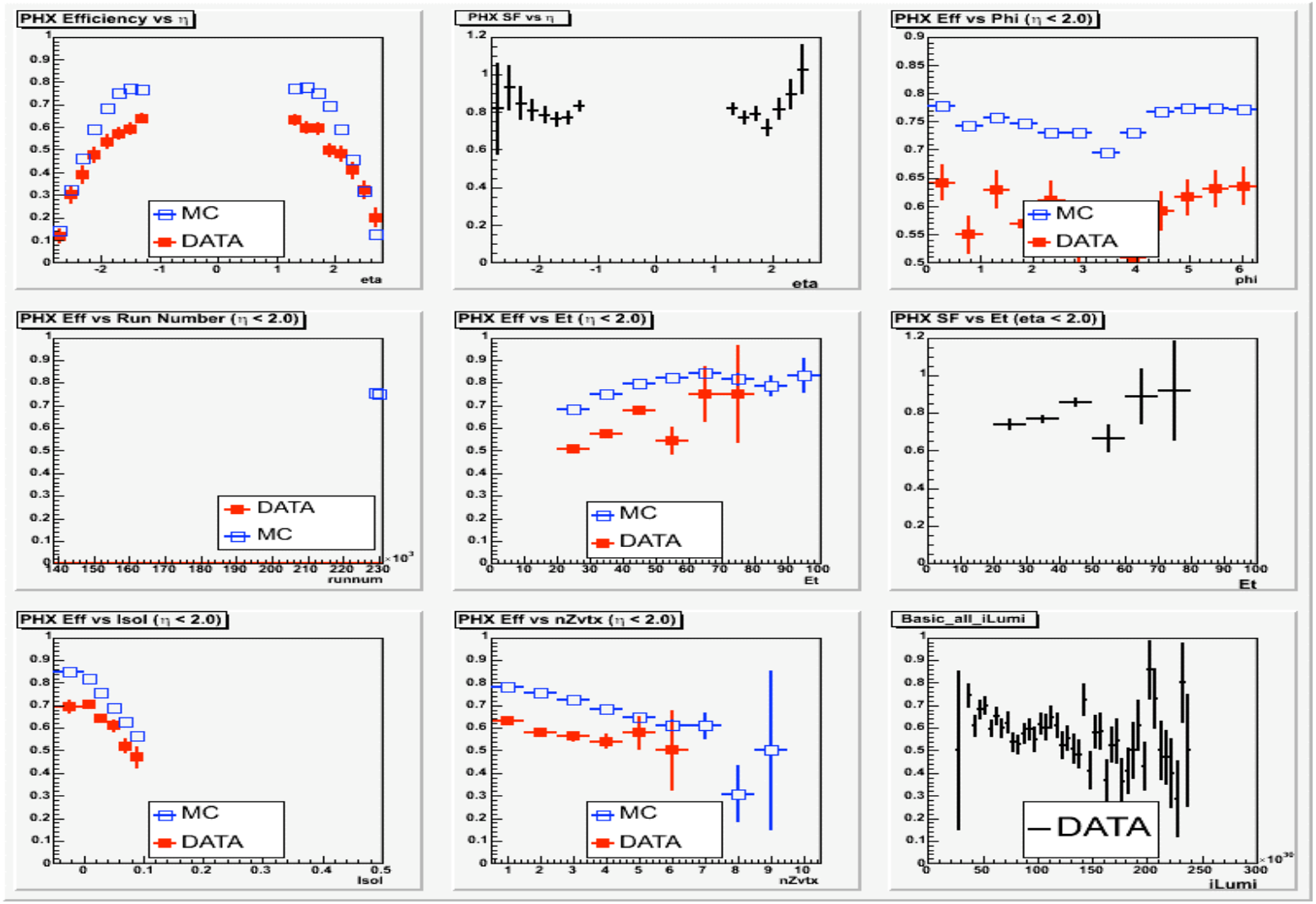
EleID Plots 2

PEM Efficiencies



EleID Plots 3

PHX Efficiencies



Muons

Dataset bhelmi: Runs 241665-246231
MC sample : zewkfm (Sept 10 2007)
GRL :P13 MC Preliminary GRL

127 files on SAM

Trigger Efficiencies not corrected for livetimes

Trigger Efficiencies

Use the two legs from the reconstructed Z (both legs pass muon ID and fiducial cuts)

Level 1:

ε^{L1}_{CMUP} is calculated from 2 independent samples, using CMUP-CMUP and CMUP-CMX samples:

$$\varepsilon^{L1(A)}_{CMUP} = \frac{\#\text{ of events with both legs triggered}}{\#\text{ of events with 1 CMX leg triggered}}$$

$$\varepsilon^{L1(B)}_{CMUP} = \frac{2R}{1+R}$$

$$R = \frac{\#\text{ of events with both legs triggered}}{\#\text{ of events with} \geq 1\text{ CMUP leg triggered}}$$

The final efficiency is an average of $\varepsilon^{L1(A)}_{CMUP}$ and $\varepsilon^{L1(B)}_{CMUP}$ weighted by the errors.

Level 2: (both leg pass L1)

$$\varepsilon^{L2}_{CMUP} = \frac{\#\text{ of events pass both L2 triggers}}{\#\text{ of events pass L2 CMX trigger}}$$

Level 3: (both leg pass L2)

$$\varepsilon^{L3}_{CMUP} = \frac{\#\text{ of events pass both L3 triggers}}{\#\text{ of events pass L3 CMX trigger}}$$

CMX trigger efficiency is calculated in similar way.

Efficiencies not corrected for livetimes

1st leg	2nd leg	1st passes	both pass	Efficiency (%)
CMUP	CMUP	1414	1236	-
CMX	CMUP	1593	1497	$93.55^{+0.42}_{-0.40}$
CMUP	CMX	1699	1497	-
CMX	CMX	552	437	$88.20^{+0.70}_{-0.65}$
CMUP	ARCH	1360	1297	-
CMUP	MK	339	200	-
ARCH	ARCH	407	360	-
ARCH	MK	109	60	-
MK	ARCH	67	60	$94.78^{+0.53}_{-0.48}$
MK	MK	29	17	$69.27^{+2.21}_{-2.14}$

TABLE I: Dataset bhmumj_p13_All-1: Muon L1 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1497	-
CMUP	1384	$97.61^{+0.41}_{-0.47}$
CMX	1341	$94.58^{+0.59}_{-0.68}$
CMUP-CMX	1309	-
CMUP-A	1197	-
CMUP-MK	187	-
CMUP-CMX-A	1135	$94.82^{+0.64}_{-0.73}$
CMUP-CMX-MK	174	$93.05^{+1.78}_{-2.33}$

TABLE II: Dataset bhmumj_p13_All-1: Muon L2 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1497	-
CMUP-CMUP$_S$	1261	-
CMX-CMX$_S$	1292	-
CMUP-CMX-CMUP$_S$	1193	$88.96^{+0.83}_{-0.93}$
CMUP-CMX-CMX$_S$	1262	$91.18^{+0.76}_{-0.80}$
CMUP-CMX-CMX$_S$-A	1091	$91.14^{+0.80}_{-0.86}$
CMUP-CMX-CMX$_S$-MK	171	$91.44^{+2.01}_{-2.48}$

TABLE III: Dataset bhmumj_p13_All-1: Muon L2 SLAM trigger efficiencies

Trigger Eff (not corrected)

Category	Events Passing	Efficiency (%)
Pass L2	1309	-
CMUP	1302	$99.54^{+0.18}_{-0.28}$
CMX	1298	$99.23^{+0.24}_{-0.32}$
CMUP-CMX	1292	-
CMUPA	1129	-
CMUPMK	173	-
CMUPARCH	1120	$99.20^{+0.28}_{-0.35}$
CMUP-MK	172	$99.42^{+0.43}_{-1.33}$

TABLE IV: Dataset bhmumj_p13_All-1: Muon L3 trigger efficiencies

Category	Efficiency (%)
CMUP	$90.90^{+0.58}_{-0.64}$
CMX	$82.78^{+0.85}_{-0.90}$
CMX A	$89.15^{+0.82}_{-0.88}$
CMX MK	$64.08^{+2.39}_{-2.69}$
CMUP SLAM	$82.84^{+0.87}_{-0.96}$
CMX SLAM	$79.81^{+0.94}_{-0.95}$
CMX SLAM A	$85.69^{+0.92}_{-0.97}$
CMX SLAM MK	$62.98^{+2.45}_{-2.72}$

TABLE V: Dataset bhmumj_p13_All-1: Muon combined trigger efficiencies

Livetimes fractions will be ready sometime next week

P12 Trigger Efficiencies (not corrected)

1st leg	2nd leg	1st passes	both pass	Efficiency (%)
CMUP	CMUP	803	720	-
CMX	CMUP	868	818	$94.44^{+0.55}_{-0.49}$
CMUP	CMX	939	818	-
CMX	CMX	335	259	$87.15^{+0.99}_{-0.89}$
CMUP	ARCH	731	694	-
CMUP	MK	208	124	-
ARCH	ARCH	231	203	-
ARCH	MK	80	46	-
MK	ARCH	48	46	$94.61^{+0.77}_{-0.65}$
MK	MK	22	10	$70.36^{+2.87}_{-2.73}$

TABLE I: Dataset bhmumjP12-1: Muon L1 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	818.000000	-
CMUP	772.000000	$98.12^{+0.47}_{-0.63}$
CMX	743.000000	$94.43^{+0.83}_{-0.92}$
CMUP SLAM	699.000000	$89.37^{+0.47}_{-0.63}$
CMX SLAM	708.000000	$90.03^{+0.83}_{-0.92}$
CMUPMK	121.000000	-
CMUPARCH	615.000000	$94.47^{+0.89}_{-1.06}$
CMUP-MK	114.000000	$94.21^{+2.07}_{-2.91}$

TABLE II: Dataset bhmumjP12-1: Muon L2 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L2	729.000000	-
CMUP	725.000000	$99.72^{+0.19}_{-0.37}$
CMX	726.000000	$99.86^{+0.13}_{-0.31}$
CMUP SLAM	660.000000	$99.72^{+0.19}_{-0.37}$
CMX SLAM	692.000000	$99.86^{+0.13}_{-0.31}$
CMUPMK	112.000000	-
CMUPARCH	612.000000	$99.84^{+0.13}_{-0.39}$
CMUP-MK	112.000000	$100.00^{+0.00}_{-1.63}$

TABLE III: Dataset bhmumjP12-1: Muon L3 trigger efficiencies

Category	Efficiency (%)
CMUP	$92.41^{+0.72}_{-0.84}$
CMX	$82.18^{+1.18}_{-1.19}$
CMUP SLAM	$84.17^{+0.68}_{-0.80}$
CMX SLAM	$78.35^{+1.15}_{-1.16}$
ARCH	$89.23^{+1.12}_{-1.23}$
MK	$66.29^{+3.07}_{-3.46}$

: Dataset bhmumjP12-1: Muon combined trigger efficiencies

Muon ID Efficiency: ID Cuts

For all events:

No cosmic tag.

For all muon types (including stubless muons):

P_T	$>$	20 GeV/c
E_{EM}	$<$	2+max(0, $(p-100)\cdot 0.0115$) GeV
E_{HAD}	$<$	6+max(0, $(p-100)\cdot 0.028$) GeV
$E_T^{isol.}/P_T$	$<$	0.1
Number of axial SL with $\geq$ 5 hits	$\geq$	3
Number of stereo SL with $\geq$ 5 hits	$\geq$	2
$\lvert z_0 \rvert$	$<$	60 cm
Tracks w/ no silicon hits: $\lvert d_0 \rvert$	$<$	0.2 cm
Tracks w/ silicon hits: $\lvert d_0 \rvert$	$<$	0.02 cm

Additionally for tight CMUP muons:

$\lvert \Delta x_{CMU} \rvert$	$<$	7 cm
$\lvert \Delta x_{CMP} \rvert$	$<$	5 cm
No bluebeam muons, run	$<$	154449

Additionally for tight CMX muons:

$\lvert \Delta x_{CMX} \rvert$	$<$	6 cm
Run	$>$	150144
No miniskirt or keystone muons, run	$<$	190697
No muons in wedge 14 west, runs	$\geq$	190697 and $\leq$ 209760

Table 1: Standard muon ID cuts for 6.1.4 data MC.

Fiducial cuts

For CMUP muons:

Fiducial distance from CMU:		
x-fid	$<$	0 cm
z-fid	$<$	0 cm
Fiducial distance from CMP:		
x-fid	$<$	0 cm
z-fid	$<$	-3 cm
No muons from bluebeam region for run $<$ 154449		

For CMX muons:

ρ_{COT}	$>$	140 cm
Fiducial distance from CMX:		
x-fid	$<$	0 cm
z-fid	$<$	-3 cm
No muons from keystone region for run $<$ 190697		
No muons from miniskirt region for run $<$ 190697		
No muons wedge 14 west for runs $\geq$ 190697 and $\leq$ 209760		

Table 2: Suggested muon fiducial cuts for tight muons in release 6.1.4.

Arches:
$0^\circ \leq \phi \leq 75^\circ$ or $105^\circ \leq \phi \leq 225^\circ$ or $315^\circ \leq \phi < 360^\circ$
Additionally, for runs 190697 - 209760, remove:
$210^\circ < \phi \leq 225^\circ$ if $\eta < 0$
Keystone:
$75^\circ < \phi < 105^\circ$ and $\eta < 0$
Miniskirt:
$225^\circ < \phi < 315^\circ$

Table 3: Cuts on ϕ for distinguishing parts of the CMX detector when determining reconstruction efficiencies.

ID Efficiency Calculation

- A first leg must be a CMUP or CMX muon passing all the cuts given in Tables 1 and 2.
- A second leg must be a muon with a CMUP or CMX stub and satisfy:
  - $P_T > 20$ GeV.
  - fiducial requirements in Table 2.
- The event must not have a cosmic tag.
- The z_0 of the two legs must pass: $|z_0^{(1)} - z_0^{(2)}| < 4$ cm.
- The invariant mass of the two tracks must pass: $81 < m(\mu^+\mu^-)$ GeV/$c^2 < 101$.

We then test the second leg to determine if it passes each of the muon ID cuts given in Table 1.

CMUP ID Efficiency

P12

Cut	Count	Efficiency (%)
No cut	2378	
E_{EM} cut	2297	$96.59^{+0.35}_{-0.43}$
E_{HAD} cut	2342	$98.49^{+0.27}_{-0.32}$
COT hits cut	2378	$100.00^{+0.00}_{-0.08}$
d_0 cut	2371	$99.71^{+0.11}_{-0.16}$
Isolation cut	2288	$96.22^{+0.39}_{-0.44}$
Δx_{CMU} cut	2364	$99.41^{+0.16}_{-0.20}$
Δx_{CMP} cut	2329	$97.94^{+0.28}_{-0.36}$
All above cuts	2118	$89.07^{+0.63}_{-0.64}$
All cuts excl. isol.	2198	$92.43^{+0.59}_{-0.58}$
Sliding isol. cut	2306	$96.97^{+0.37}_{-0.41}$
All cuts (sliding isol.)	2133	$89.70^{+0.59}_{-0.68}$
χ^2 cut	2378	$100.00^{+0.00}_{-0.08}$
All cuts (χ^2)	2118	$89.07^{+0.63}_{-0.64}$
All track cuts	2177	$91.55^{+0.59}_{-0.58}$
All trk cuts excl. isol.	2260	$95.04^{+0.45}_{-0.48}$

P13

Cut	Count	Efficiency (%)
No cut	4217	
E_{EM} cut	4098	$97.18^{+0.26}_{-0.28}$
E_{HAD} cut	4150	$98.41^{+0.18}_{-0.21}$
COT hits cut	4217	$100.00^{+0.00}_{-0.04}$
d_0 cut	4204	$99.69^{+0.08}_{-0.11}$
Isolation cut	4082	$96.80^{+0.25}_{-0.29}$
Δx_{CMU} cut	4200	$99.60^{+0.09}_{-0.13}$
Δx_{CMP} cut	4148	$98.36^{+0.18}_{-0.23}$
All above cuts	3820	$90.59^{+0.45}_{-0.47}$
All cuts excl. isol.	3939	$93.41^{+0.37}_{-0.41}$
Sliding isol. cut	4125	$97.82^{+0.22}_{-0.25}$
All cuts (sliding isol.)	3861	$91.56^{+0.41}_{-0.47}$
χ^2 cut	4217	$100.00^{+0.00}_{-0.04}$
All cuts (χ^2)	3820	$90.59^{+0.45}_{-0.47}$
All track cuts	3903	$92.55^{+0.39}_{-0.44}$
All trk cuts excl. isol.	4023	$95.40^{+0.33}_{-0.36}$

CMUP ID SF

P12

Cut	Scale Factor
No cut	
E_{EM} cut	$1.0052^{+0.0038}_{-0.0045}$
E_{HAD} cut	$1.0009^{+0.0028}_{-0.0033}$
COT hits cut	$1.0001^{+0.0000}_{-0.0008}$
d_0 cut	$0.9984^{+0.0011}_{-0.0016}$
Isolation cut	$0.9910^{+0.0041}_{-0.0046}$
Δx_{CMU} cut	$0.9942^{+0.0016}_{-0.0020}$
Δx_{CMP} cut	$0.9857^{+0.0028}_{-0.0036}$
All above cuts	$0.9765^{+0.0070}_{-0.0071}$
All cuts excl. isol.	$0.9852^{+0.0063}_{-0.0063}$
Sliding isol. cut	$0.9925^{+0.0038}_{-0.0043}$
All cuts (sliding isol.)	$0.9773^{+0.0065}_{-0.0076}$
χ^2 cut	$1.0000^{+0.0000}_{-0.0008}$
All cuts (χ^2)	$0.9765^{+0.0070}_{-0.0071}$
All track cuts	$0.9973^{+0.0066}_{-0.0064}$
All trk cuts excl. isol.	$1.0064^{+0.0048}_{-0.0052}$

P13

Cut	Scale Factor
No cut	
E_{EM} cut	$1.0113^{+0.0028}_{-0.0030}$
E_{HAD} cut	$0.9999^{+0.0020}_{-0.0022}$
COT hits cut	$1.0001^{+0.0000}_{-0.0004}$
d_0 cut	$0.9983^{+0.0008}_{-0.0011}$
Isolation cut	$0.9969^{+0.0026}_{-0.0031}$
Δx_{CMU} cut	$0.9961^{+0.0009}_{-0.0013}$
Δx_{CMP} cut	$0.9900^{+0.0019}_{-0.0024}$
All above cuts	$0.9930^{+0.0051}_{-0.0053}$
All cuts excl. isol.	$0.9955^{+0.0040}_{-0.0045}$
Sliding isol. cut	$1.0011^{+0.0023}_{-0.0026}$
All cuts (sliding isol.)	$0.9974^{+0.0047}_{-0.0053}$
χ^2 cut	$1.0000^{+0.0000}_{-0.0004}$
All cuts (χ^2)	$0.9930^{+0.0051}_{-0.0053}$
All track cuts	$1.0081^{+0.0044}_{-0.0050}$
All trk cuts excl. isol.	$1.0101^{+0.0036}_{-0.0039}$

CMX ID Efficiencies

P12

Cut	Count	Efficiency (%)
No cut	1491	
E_{EM} cut	1447	$97.05^{+0.44}_{-0.49}$
E_{HAD} cut	1468	$98.46^{+0.30}_{-0.39}$
COT hits cut	1491	$100.00^{+0.00}_{-0.12}$
d_0 cut	1489	$99.87^{+0.09}_{-0.18}$
Isolation cut	1436	$96.31^{+0.49}_{-0.53}$
Δx_{CMX} cut	1485	$99.60^{+0.17}_{-0.24}$
All above cuts	1368	$91.75^{+0.68}_{-0.78}$
All cuts excl. isol.	1417	$95.04^{+0.52}_{-0.65}$
Sliding isol. cut	1463	$98.12^{+0.34}_{-0.44}$
All cuts (sliding isol.)	1394	$93.49^{+0.60}_{-0.67}$
χ^2 cut	1491	$100.00^{+0.00}_{-0.12}$
All cuts (χ^2)	1368	$91.75^{+0.68}_{-0.78}$
All track cuts	1373	$92.09^{+0.74}_{-0.73}$
All trk cuts excl. isol.	1422	$95.37^{+0.58}_{-0.60}$

P13

Cut	Count	Efficiency (%)
No cut	2597	
E_{EM} cut	2521	$97.07^{+0.31}_{-0.37}$
E_{HAD} cut	2544	$97.96^{+0.26}_{-0.33}$
COT hits cut	2596	$99.96^{+0.03}_{-0.09}$
d_0 cut	2584	$99.50^{+0.15}_{-0.17}$
Isolation cut	2495	$96.07^{+0.39}_{-0.44}$
Δx_{CMX} cut	2587	$99.61^{+0.12}_{-0.16}$
All above cuts	2370	$91.26^{+0.59}_{-0.59}$
All cuts excl. isol.	2453	$94.46^{+0.44}_{-0.49}$
Sliding isol. cut	2524	$97.19^{+0.35}_{-0.39}$
All cuts (sliding isol.)	2396	$92.26^{+0.54}_{-0.54}$
χ^2 cut	2597	$100.00^{+0.00}_{-0.07}$
All cuts (χ^2)	2370	$91.26^{+0.59}_{-0.59}$
All track cuts	2378	$91.57^{+0.57}_{-0.60}$
All trk cuts excl. isol.	2463	$94.84^{+0.45}_{-0.48}$

CMX ID SF

P12

Cut	Scale Factor
No cut	
E_{EM} cut	$1.0048^{+0.0046}_{-0.0052}$
E_{HAD} cut	$1.0073^{+0.0031}_{-0.0040}$
COT hits cut	$1.0002^{+0.0001}_{-0.0012}$
d_0 cut	$0.9997^{+0.0009}_{-0.0018}$
Isolation cut	$0.9906^{+0.0051}_{-0.0056}$
Δx_{CMX} cut	$0.9975^{+0.0017}_{-0.0025}$
All above cuts	$1.0013^{+0.0076}_{-0.0087}$
All cuts excl. isol.	$1.0094^{+0.0057}_{-0.0071}$
Sliding isol. cut	$1.0038^{+0.0036}_{-0.0046}$
All cuts (sliding isol.)	$1.0149^{+0.0067}_{-0.0075}$
χ^2 cut	$1.0000^{+0.0000}_{-0.0012}$
All cuts (χ^2)	$1.0013^{+0.0076}_{-0.0087}$
All track cuts	$1.0035^{+0.0082}_{-0.0081}$
All trk cuts excl. isol.	$1.0114^{+0.0062}_{-0.0065}$

P13

Cut	Scale Factor
No cut	
E_{EM} cut	$1.0054^{+0.0034}_{-0.0040}$
E_{HAD} cut	$1.0021^{+0.0028}_{-0.0034}$
COT hits cut	$0.9998^{+0.0003}_{-0.0009}$
d_0 cut	$0.9962^{+0.0015}_{-0.0017}$
Isolation cut	$0.9879^{+0.0041}_{-0.0046}$
Δx_{CMX} cut	$0.9977^{+0.0012}_{-0.0016}$
All above cuts	$0.9959^{+0.0066}_{-0.0066}$
All cuts excl. isol.	$1.0035^{+0.0049}_{-0.0053}$
Sliding isol. cut	$0.9941^{+0.0036}_{-0.0040}$
All cuts (sliding isol.)	$1.0016^{+0.0060}_{-0.0060}$
χ^2 cut	$1.0000^{+0.0000}_{-0.0007}$
All cuts (χ^2)	$0.9959^{+0.0066}_{-0.0066}$
All track cuts	$0.9978^{+0.0064}_{-0.0068}$
All trk cuts excl. isol.	$1.0061^{+0.0049}_{-0.0053}$

Reconstruction Efficiency

The reconstruction efficiency is defined as the probability to find a muon stub and link it to a track. First, to know whether we should find a stub or not we have to know that the muon is fiducial in any of the muon chambers. We use the **MuonFiducialTool** class for this purpose. We define a track as being fiducial in a given muon system if it passes the cuts defined in Tables 2 and 3 for that system.

Events Selection
No cosmic tag and 2 tracks passing the following:

- Oppositely charged.
- $|z_0^{(1)} - z_0^{(2)}| < 4$ cm.
- $81\ \mathrm{GeV}/c^2 < m(\mu^+\mu^-) < 101\ \mathrm{GeV}/c^2$
- The first leg must be a reconstructed **CdfMuon** passing all the ID and fiducial cuts given in Tables 1 and 2. It must also match to the level 1 trigger information.
- The second leg must be fiducial in both the CMU and CMP sub-detectors (or the CMX sub-detector) and satisfy:
  - $P_T > 20$ GeV.
  - $E_{EM} < 1.5 \cdot (2+\max(0, (p-100) \cdot 0.0115))$ GeV
  - $E_{HAD} < 1.5 \cdot (6+\max(0, (p-100) \cdot 0.028)$ GeV

$$\varepsilon_{Reco} = \frac{\#\text{tracks fiducial and linked to a stub}}{\#\text{ tracks fiducial}}$$

Reconstruction Efficiency

The first leg must pass all the ID and Fid. cuts and must match to the level 1 trigger information. If the second leg is Fiducial, and pass "P_T, E_{EM}, E_{HAD}" cuts, we examine this track to see if is linked to a muon stub or not.

P11

Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	3769	3412	$90.53^{+0.46}_{-0.51}$
CMX	2333	2221	$95.20^{+0.43}_{-0.50}$
CMX Arches	1829	1796	$98.20^{+0.32}_{-0.37}$
CMX Miniskirt	422	346	$81.99^{+1.90}_{-2.01}$
CMX Keystone	82	79	$96.34^{+1.90}_{-3.47}$
CMU-only	957	840	$87.77^{+1.04}_{-1.10}$
CMP-only	1120	1015	$90.62^{+0.83}_{-0.93}$

P12

Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	2534	2311	$91.20^{+0.55}_{-0.62}$
CMX	1524	1455	$95.47^{+0.57}_{-0.60}$
CMX Arches	1165	1144	$98.20^{+0.41}_{-0.47}$
CMX Miniskirt	283	238	$84.10^{+2.13}_{-2.56}$
CMX Keystone	76	73	$96.05^{+2.19}_{-3.67}$
CMU-only	651	567	$87.10^{+1.28}_{-1.45}$
CMP-only	606	558	$92.08^{+1.18}_{-1.16}$
CMX MiniKey	359	311	$86.63^{+1.75}_{-1.96}$

P13

Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	4498	4113	$91.44^{+0.43}_{-0.45}$
CMX	2642	2527	$95.65^{+0.42}_{-0.46}$
CMX Arches	2115	2067	$97.73^{+0.34}_{-0.39}$
CMX Miniskirt	435	374	$85.98^{+1.62}_{-1.89}$
CMX Keystone	92	86	$93.48^{+2.42}_{-3.83}$
CMU-only	1095	969	$88.49^{+1.01}_{-1.04}$
CMP-only	1253	1153	$92.02^{+0.80}_{-0.86}$
CMX MiniKey	527	460	$87.29^{+1.48}_{-1.64}$

Reconstruction SF

P11

Category	Scale Factor
CMUP	$0.9276^{+0.0048}_{-0.0053}$
CMX	$0.9557^{+0.0043}_{-0.0050}$
CMX Arches	$0.9840^{+0.0032}_{-0.0037}$
CMX Miniskirt	$0.8277^{+0.0192}_{-0.0203}$
CMX Keystone	$0.9736^{+0.0193}_{-0.0351}$
CMU-only	$0.8991^{+0.0107}_{-0.0114}$
CMP-only	$0.9224^{+0.0085}_{-0.0095}$
CMX MiniKey	$0.8515^{+0.0173}_{-0.0173}$

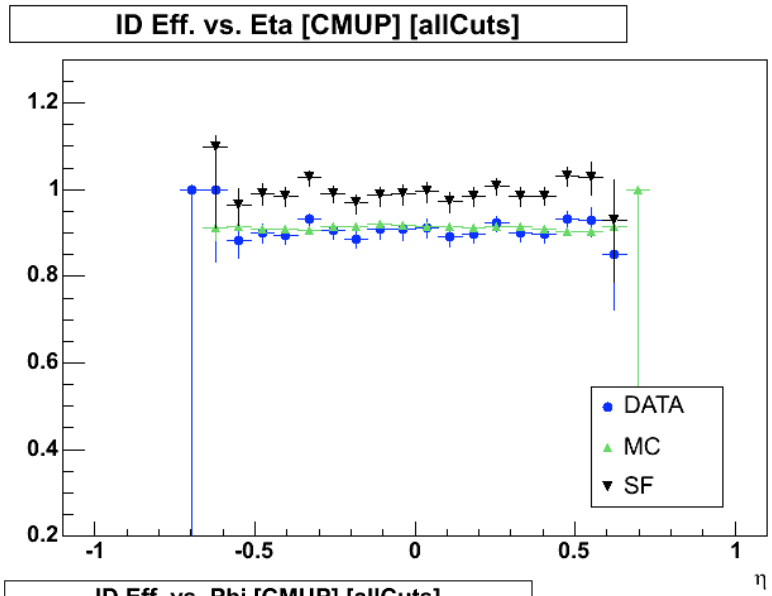
P12

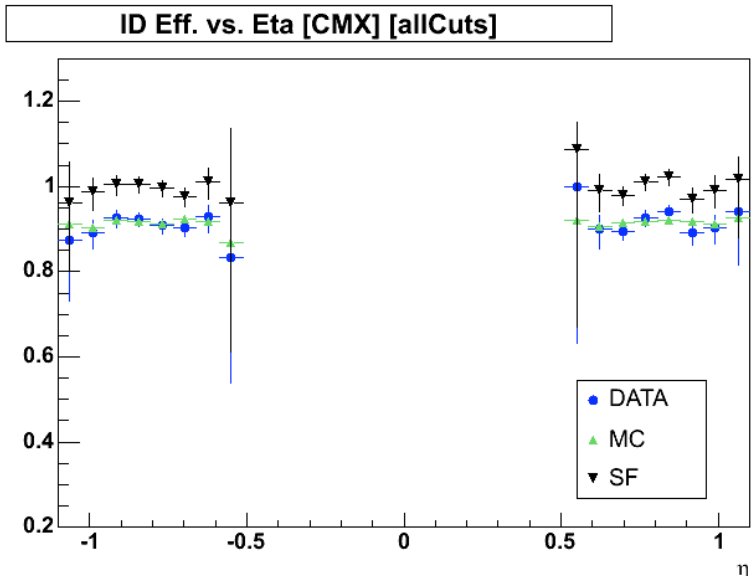
Category	Scale Factor
CMUP	$0.9345^{+0.0056}_{-0.0064}$
CMX	$0.9584^{+0.0058}_{-0.0060}$
CMX Arches	$0.9840^{+0.0041}_{-0.0047}$
CMX Miniskirt	$0.8490^{+0.0215}_{-0.0258}$
CMX Keystone	$0.9706^{+0.0222}_{-0.0372}$
CMU-only	$0.8921^{+0.0132}_{-0.0149}$
CMP-only	$0.9372^{+0.0121}_{-0.0118}$
CMX MiniKey	$0.8747^{+0.0177}_{-0.0177}$

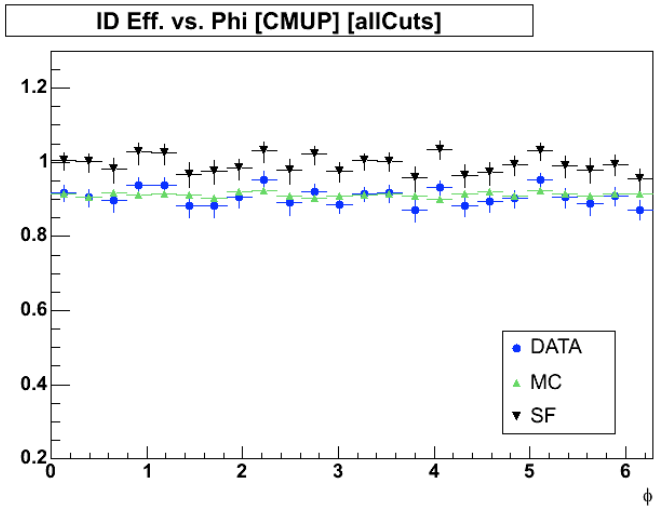
P13

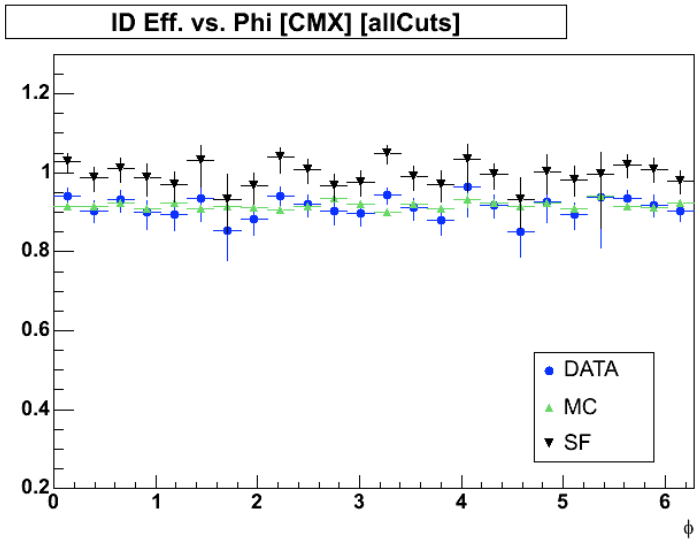
Category	Scale Factor
CMUP	$0.9390^{+0.0045}_{-0.0047}$
CMX	$0.9601^{+0.0042}_{-0.0046}$
CMX Arches	$0.9793^{+0.0034}_{-0.0039}$
CMX Miniskirt	$0.8671^{+0.0164}_{-0.0191}$
CMX Keystone	$0.9474^{+0.0247}_{-0.0390}$
CMU-only	$0.9042^{+0.0104}_{-0.0107}$
CMP-only	$0.9355^{+0.0082}_{-0.0088}$
CMX MiniKey	$0.8812^{+0.0150}_{-0.0150}$

Reco and ID Plots

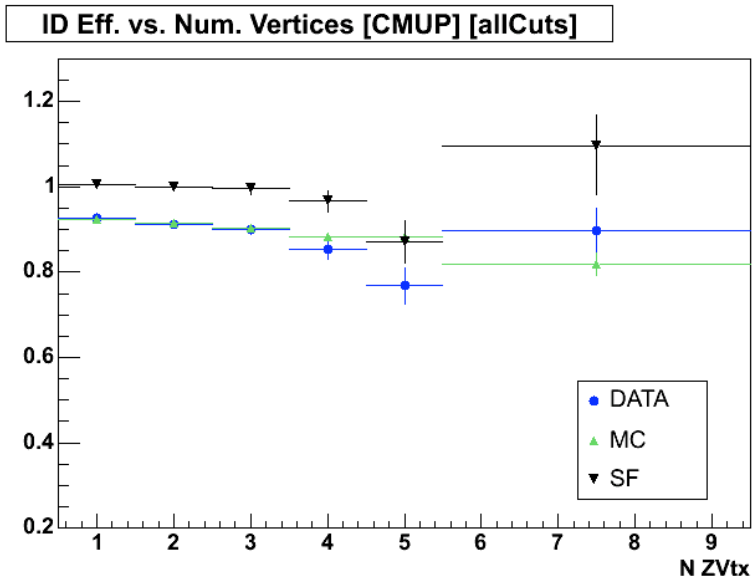


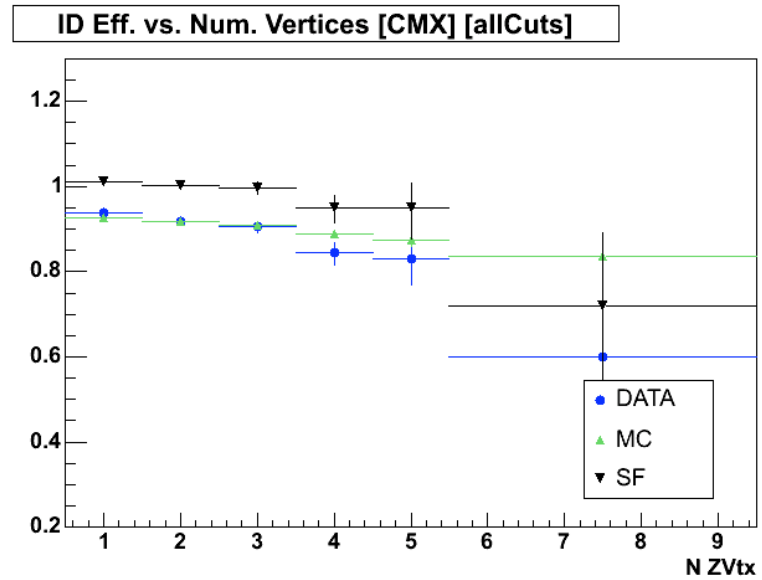


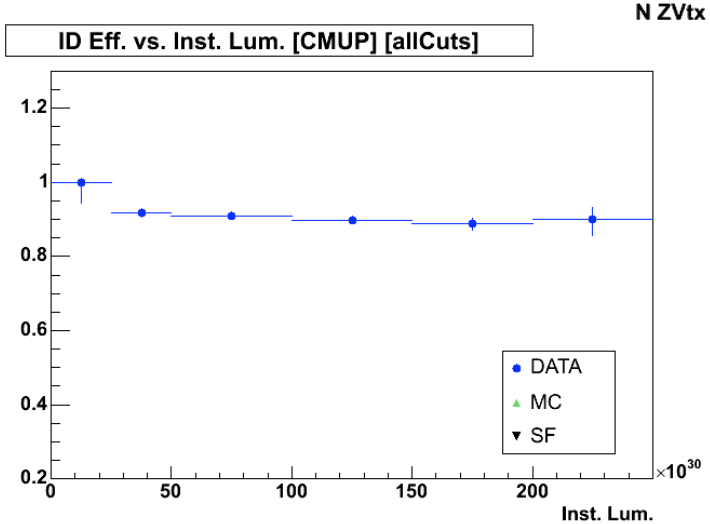


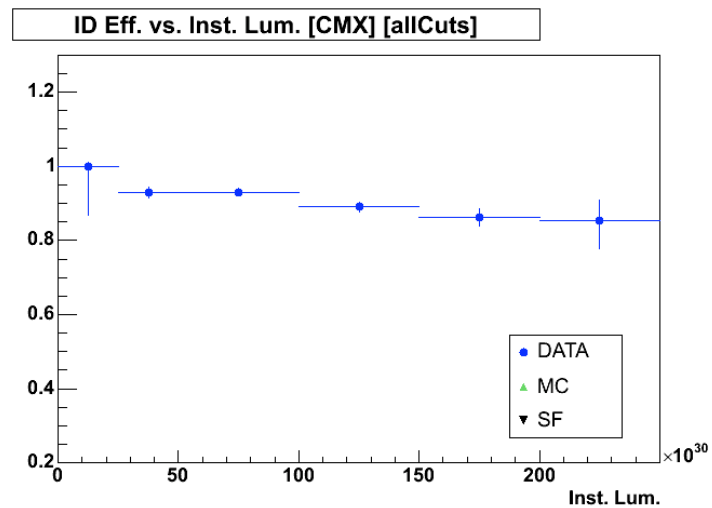


Reco and ID Plots

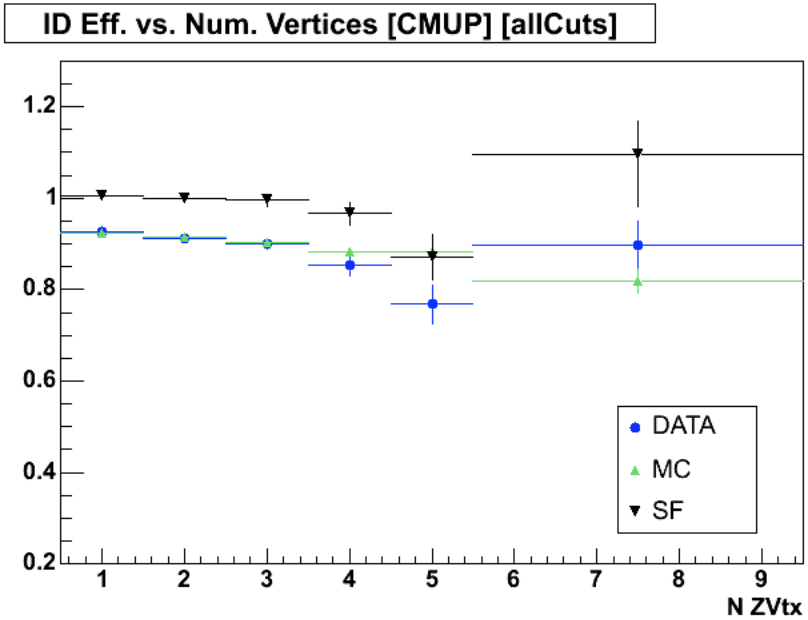


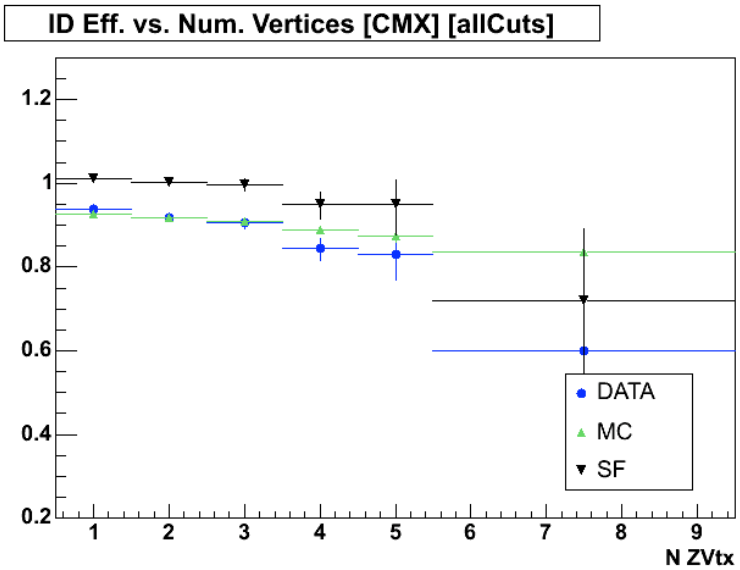




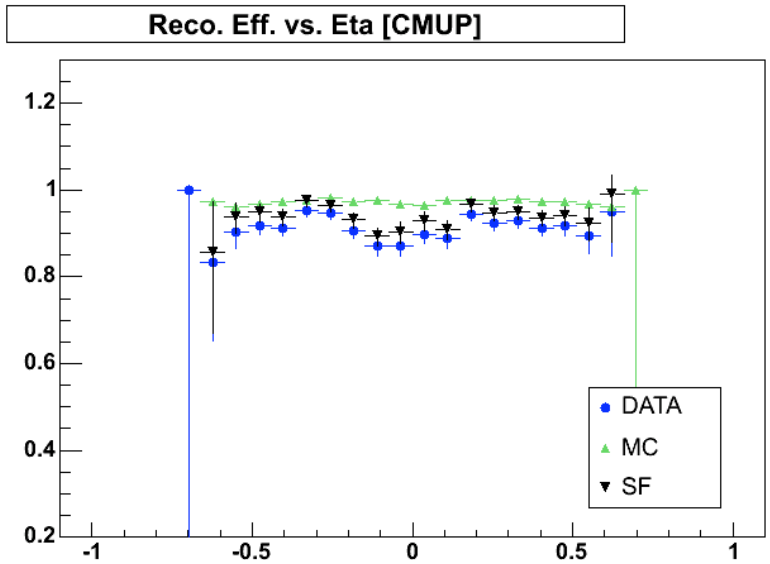


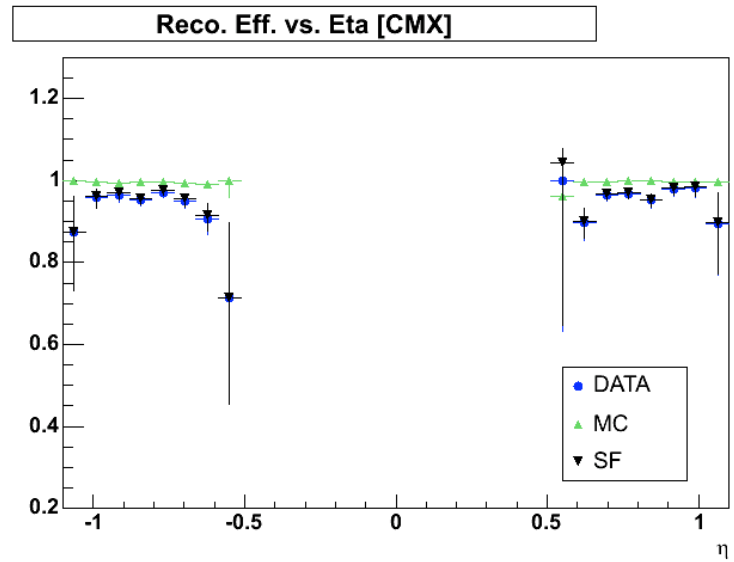
Reco and ID Plots

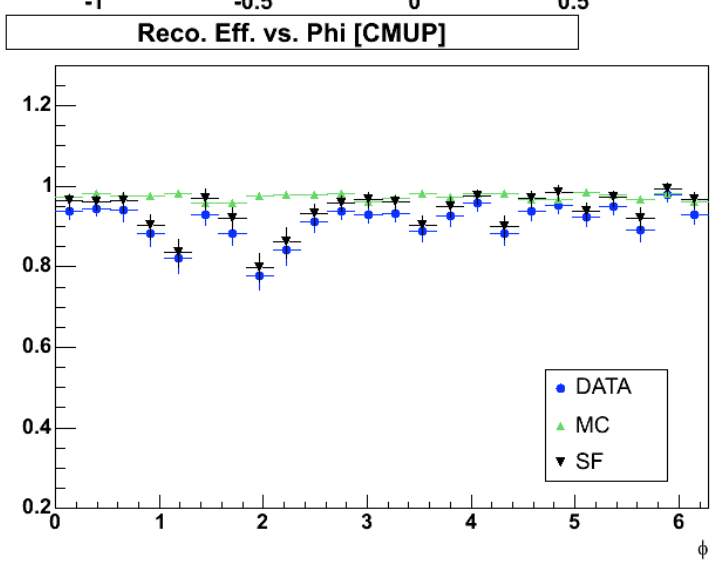


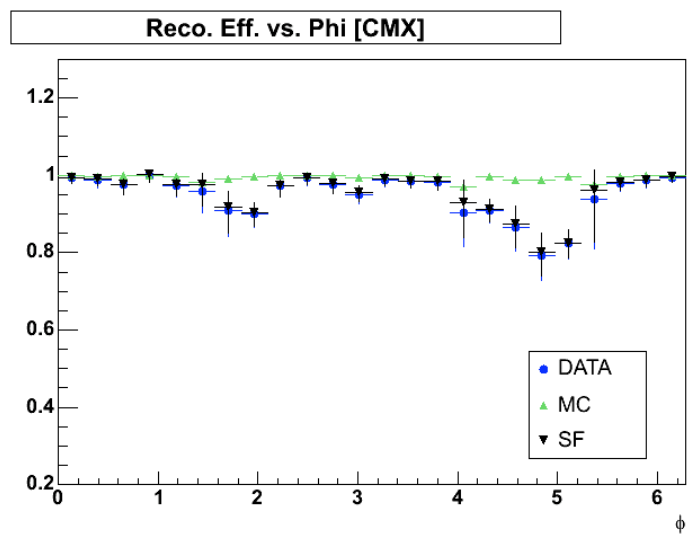


Reco and ID Plots









Conclusions

- A preliminary look at P13 data has been presented:
  - Efficiencies and SF for high PT muons (Id and Reco) in good agreement with previous periods
  - Muon Trigger Eff to be completed (livetimes)
  - Electrons ID looks ok
  - Electron Trigger to be done

Electron Trigger: Tracking

1 electron with $E_T > 25GeV$
$\not{E}_T > 25GeV$
reject cosmic events

Table: Offline *W* selection.

Electron Variables	Current baseline cuts
E_T	> 20 GeV
p_T	> 10 GeV/c
N_{SL}^{axial} with 5 hits	≥ 3
N_{SL}^{stereo} with 5 hits	≥ 2
Fiducial	1
Had/Em	$< 0.055 + 0.00045E$
L_{shr}	< 0.2
E/p	< 2 (for $p_T < 50GeV$)
$\lvert Z_{vertex} \rvert$	< 60 cm
$\lvert \Delta X \rvert$	$-3.0 < Q_{trk}\Delta X < 1.5$ cm
$\lvert \Delta Z \rvert$	< 3 cm
χ^2_{strip}	< 10
Conversion	$\neq 1$ (not)

Table: Offline baseline cuts for central electrons.

L1 Tracking Efficiency

$$\epsilon(\text{L1_XFT_PT8}) = \frac{\text{numW \& passed L1_CEM8_PT8}}{\text{numW}}$$

numW means the number of *W* candidates that passed the W-NOTRACK path.

L2 Tracking Efficiency

At L2, there is no additional tracking done except for receiving the XFT information from L1.

$$\epsilon(\text{L2_XFT_PT8}) = \frac{\text{numW \& passed L1_CEM8_PT8 \& passed L2_CEM16_PT8}}{\text{numW \& passed L1_CEM8_PT8}}$$

L3 Tracking Efficiency

$$\epsilon(\text{L3_PT9}) = \frac{\text{numW \& passed L1_CEM8_PT8 \& L2_CEM16_PT8 \& L3_CEM18_PT9}}{\text{numW \& passed L1_CEM8_PT8 \& L2_CEM16_PT8}}$$

Electron Trigger: Calorimeter

L2 Calorimeter Efficiency

- Require at least 1 electron satisfying the baseline cuts and $E_T >$ 18GeV.
- Use ELECTRON_CENTRAL_18_NO_L2 path.
- Efficiency reaches 100% at about 25 GeV.

$$\epsilon(\text{L2_CEM16}) = \frac{\text{numEl \& passed L1_CEM8_PT8 \& L2_PS \& L2_CEM16}}{\text{numEl \& passed L1_CEM8_PT8 \& L2_PS}}$$

L3 Calorimeter Efficiency

- Use the calibration dataset(blpc).
- Use ELECTRON_CENTRAL_8_NO_L2 path.
- Efficiency reaches 100% at about 20 GeV.

$$\epsilon(\text{L3_CEM18}) = \frac{\text{numEl \& passed EL_CENT_8_NO_L2 \& L2_CEM16 \& L3_CEM18}}{\text{numEl \& passed EL_CENT_8_NO_L2 \& L2_CEM16}}$$

Electron Trigger: Results

Analyzed about all data

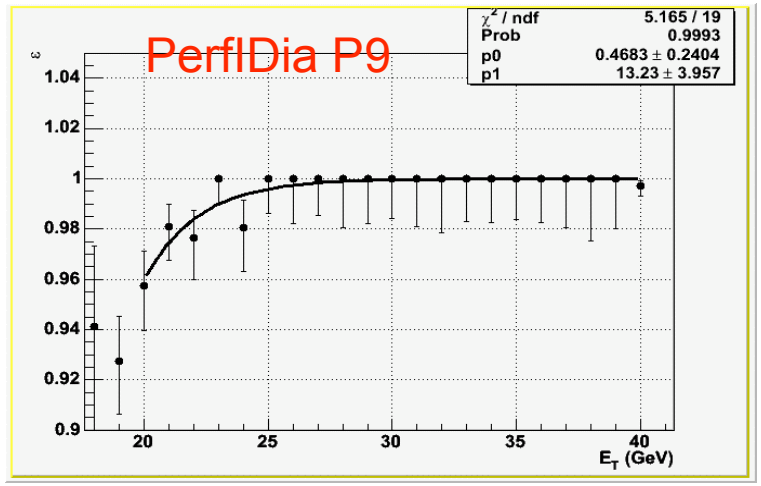
NofflW	84366
NcemL1	81569
NcemL2	81491
NcemL3	80995

Trigger	Period 9	Period 10A	Period 10B	Period 11
L1_XFT_PT8	0.9651(6)	0.9673(7)	0.9650(29)	0.9688(4)
L2_XFT_PT8	0.9992(1)	0.9993(1)	0.9992(5)	0.9988(4)
L3 tracking	0.9954(2)	0.9932(3)	0.9968(9)	0.9935(4)
Total Tracking	0.9598(7)	0.9600(8)	0.9611(31)	0.9614(4)

Period 12
0.96857 ± 0.003
0.9990 ± 0.003
0.9940 ± 0.003
0.9600 ± 0.003

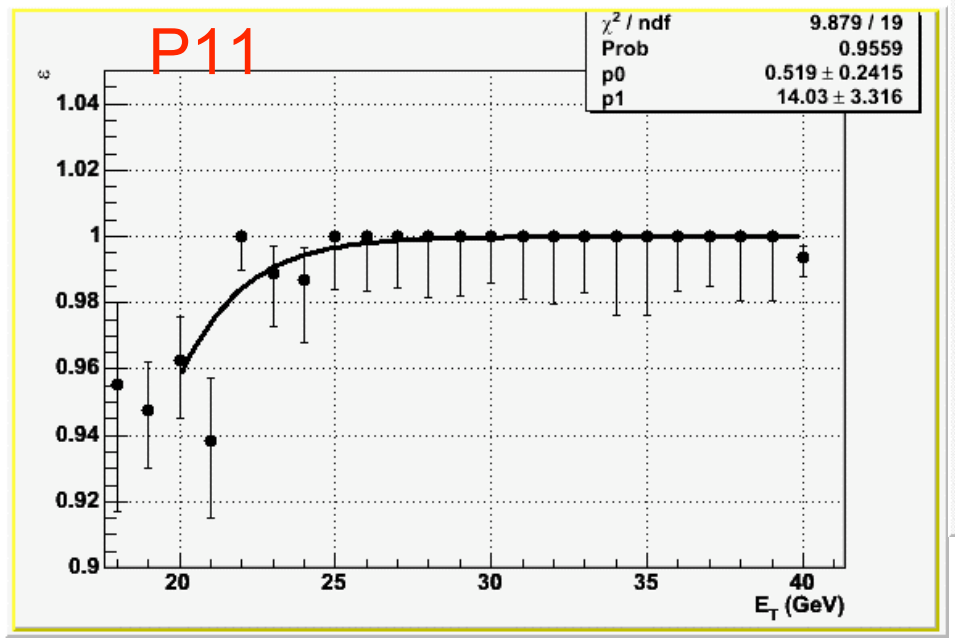
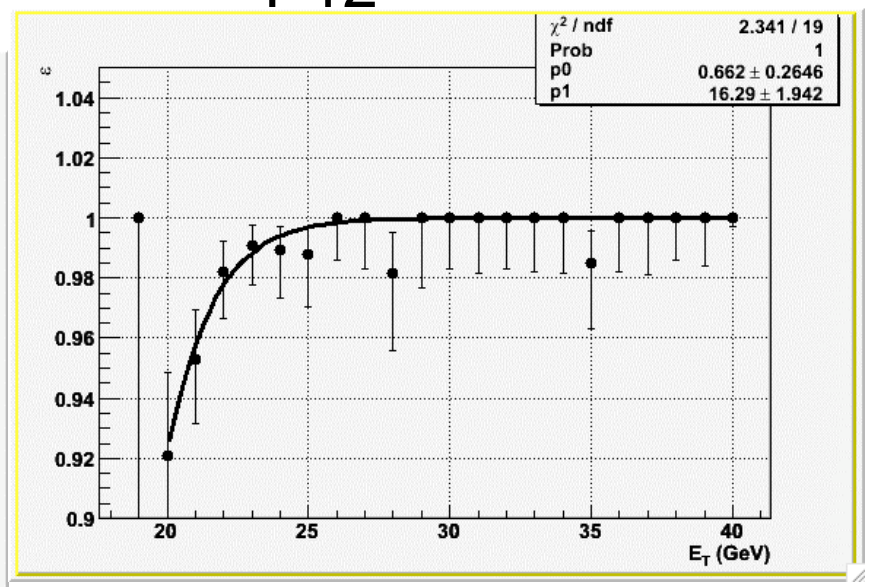
Period 13

Electron Trigger : Results



L2_CEM16 calorimeter efficiency

$$\epsilon = \frac{1}{1 + e^{-\beta(E_T - \alpha)}}.$$



P12