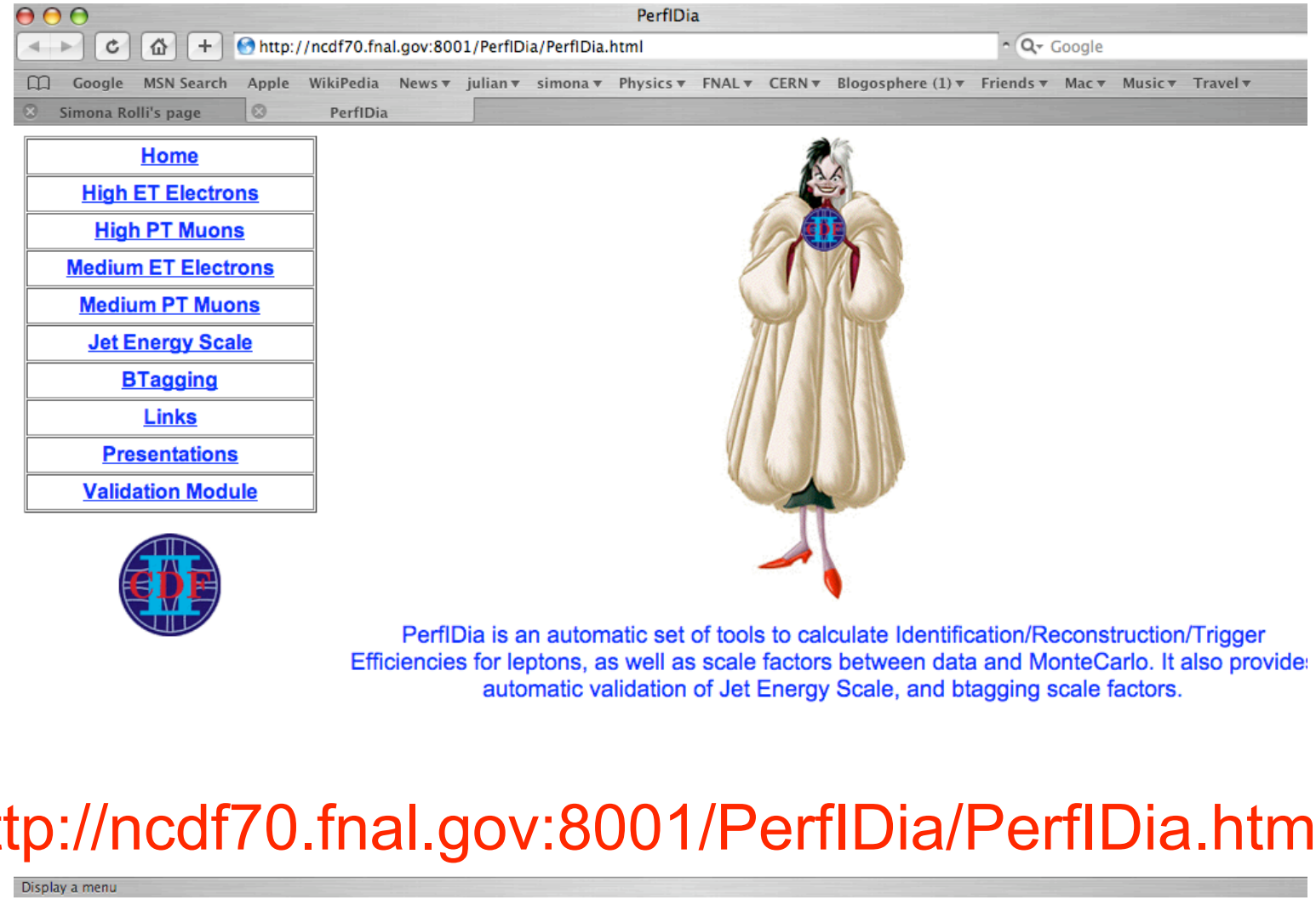
Lepton Efficiencies for Period 9 Data using PerfIDia (preblessing)

Simona Rolli

Web Page



http://ncdf70.fnal.gov:8001/PerfIDia/PerfIDia.html

Talk Outline

- Current validation of the new high PT leptons samples (200 pb): bhelmi, bhmumi aka Period 9 data (run 222529 to 228596)
  - High Et Electron ID (w/ D. Hare) -bhelmi
  - High Et Electron Trigger (w/ BY Han) -bhelmi
  - High PT Muons (L. Lovas) -bhmumi

Electrons ID

PerfIDia

http://ncdf70.fnal.gov:8001/PerfIDia/PerfIDia.html

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Simona Rolli's page | PerfIDia

- Home
- High ET Electrons
- High PT Muons
- Medium ET Electrons
- Medium PT Muons
- Jet Energy Scale
- BTagging
- Links
- Presentations
- Validation Module

- Documentation:
  - Web Page
  - CDF Note 8274, June 1st, 2006
  - CDF Note 8614, November 27, 2006
  - Joint Physics Meeting Blessing, November 17, 2006
- Code:
  - Instructions on how to run the code
- Results:
  - Period 9 data ( ): Runs 222529 to 228596 (MC sample zewkcd):
    - Mass distributions with comparisons between data and MC
    - Efficiencies and Scale Factors for data and MC (file not formatted!)
  - Post ShutDown data (June 2006 to September 2006): Runs 217990 to 222426 (MC sample zewkcd):
    - Mass distributions with comparisons between data and MC
    - Efficiencies and Scale Factors for data and MC (file not formatted!)
  - bhel0i Pre ShutDown data (September 2005 to June 2006): Runs 203819 to 212133: (MC sample zewkcd)
    - Mass distributions with comparisons between data and MC
    - Efficiencies and Scale Factors for data and MC (file not formatted!)
  - bhel0h (December 2004 to September 2005): Runs 190697 to 203799 (MC sample zewkcd)
    - Mass distributions with comparisons between data and MC
    - Efficiencies and Scale Factors for data and MC (file not formatted!)
  - bhel0d (2002 to August 2004) : Runs 138425 to 186598 (MC sample zewkcd)
    - Mass distributions with comparisons between data and MC
    - Efficiencies and Scale Factors for data and MC (file not formatted!)

How to run the electron efficiency code on TopNtuple
The code runs in two steps:

- A standalone executable runs on TopNtuple:
  - 1.) main_lepid: basically reads in the command line arguments and then runs ana_lepid

Electrons ID

Dataset bhelmi: Runs 222529 to 228596
MC sample : zewkcd (reprocessed as zewkmd)
GRL : goodrun_em_nosi_v15

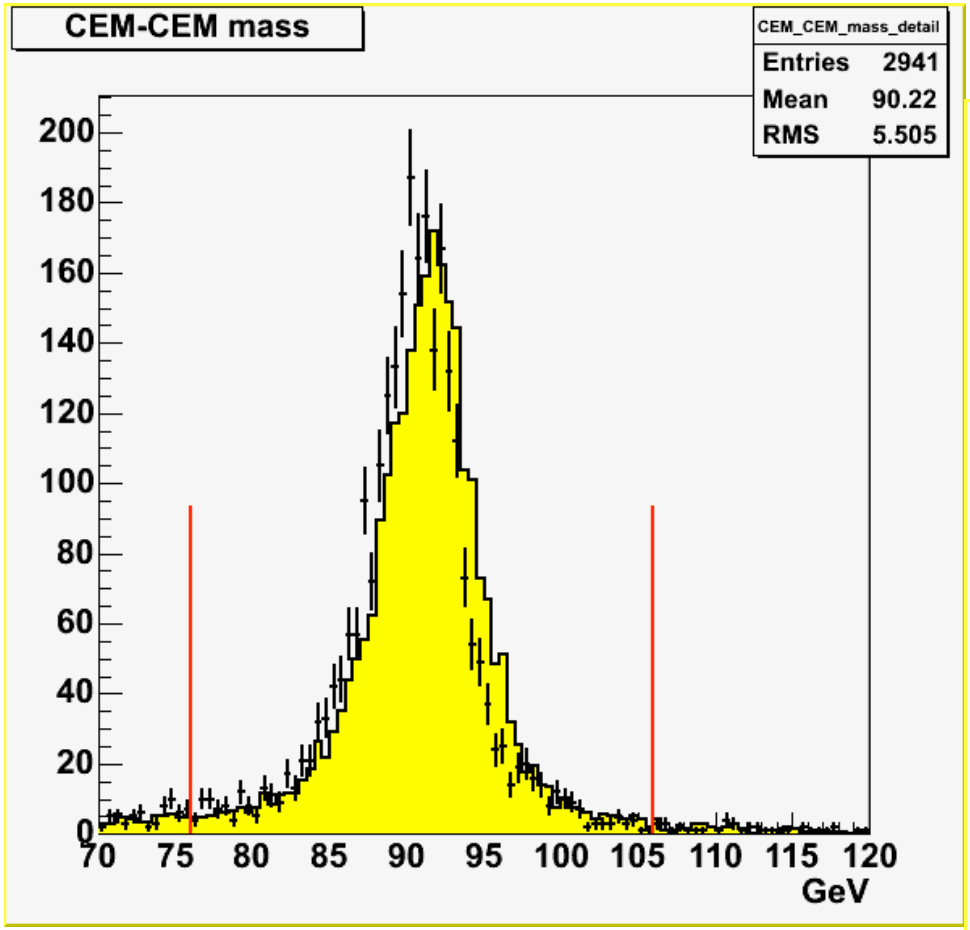
Complete lists of files used here:
http://ncdf70.fnal.gov:8001/PerfIDia/validation/bhelmi/bhelmi_fieb26.rootlist
http://ncdf70.fnal.gov:8001/PerfIDia/validation/bhelmi/zewkcd.rootlist

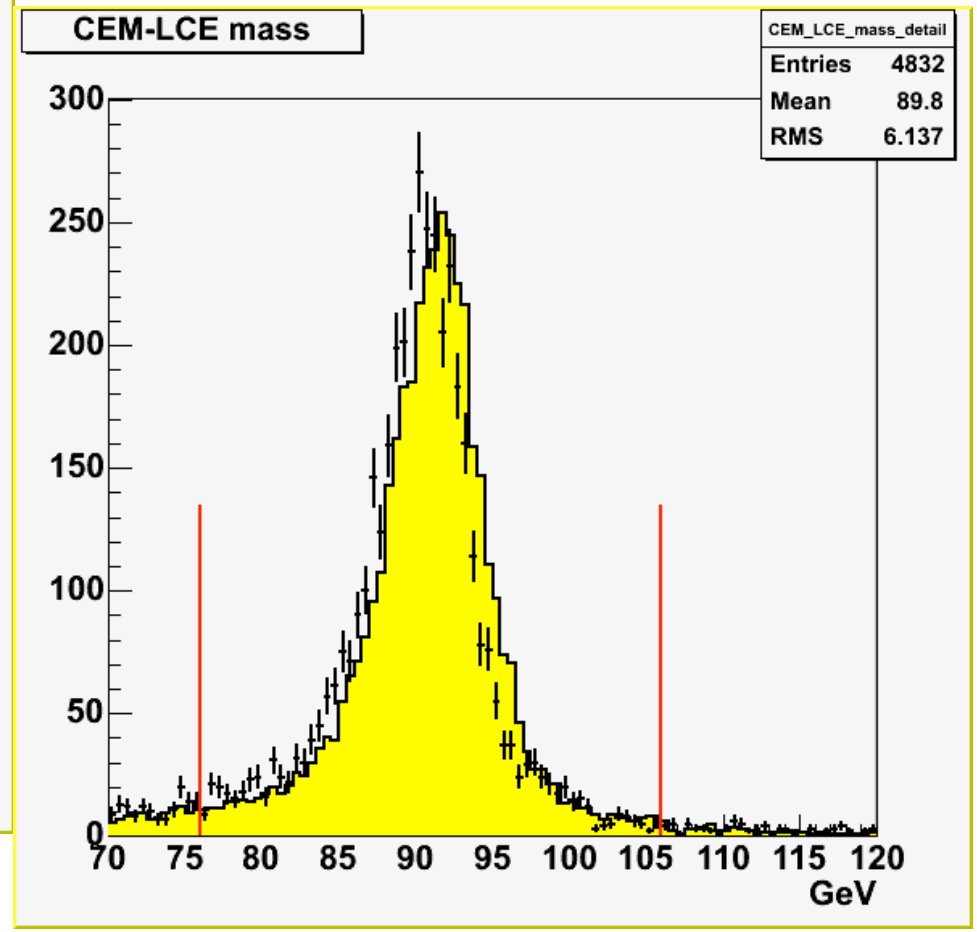
Electron ID Results

Efficiency	0d	0h	0i PreSD	0i PostSD	bhelmi
CEM	0.802 +/- 0.003	0.796 +/- 0.003	0.787 +/- 0.003		0.789 +\- 0.005
NonIsol CEM	0.826 +/- 0.003	0.822 +/- 0.003	0.814 +/- 0.003		0.817+\0.004
Loose CEM	0.924 +/- 0.002	0.923 +/- 0.002	0.915 +/- 0.002		0.914 +/- 0.001
NonIsol Loose CEM	0.950 +/- 0.002	0.949 +/- 0.002	0.944 +/- 0.002		0.945 +/- 0.001
PHX (|Etal < 2.0)	0.714 +/- 0.005	0.719 +/- 0.004	0.714 +/- 0.004		0.697 +/- 0.007
PHX (|Etal < 2.8)	0.638 +/- 0.004	0.637 +/- 0.004	0.641 +/- 0.005	0.623 +/- 0.006	0.620 +\-0.006
PEM (|Etal < 2.0)	0.834 +/- 0.004	0.825 +/- 0.004	0.815 +/- 0.004		0.797 +/- 0.006
PEM (|Etal < 2.8)	0.822 +/- 0.003	0.804 +/- 0.003	0.791 +/- 0.004	0.784 +/- 0.005	0.775+\-0.006

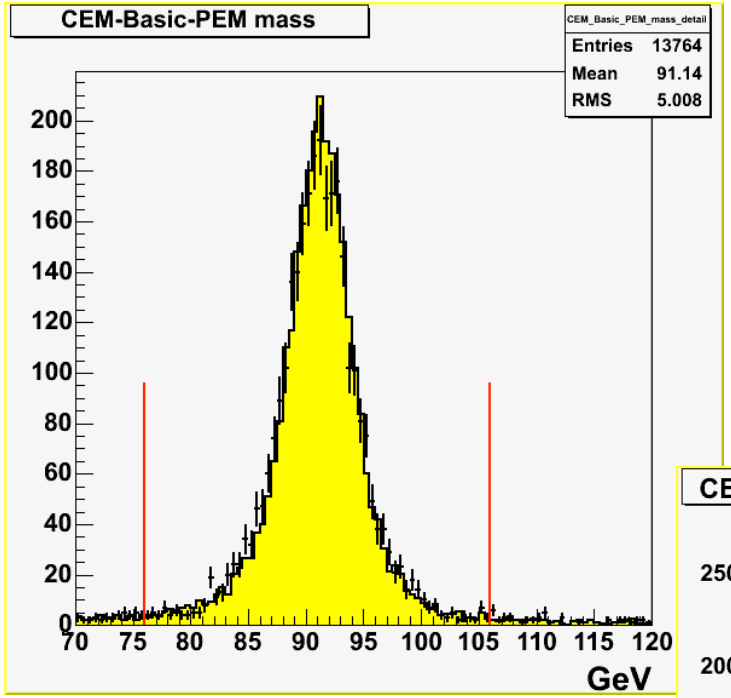
Scale Factor	0d	0h	0i PreSD	0i PostSD	bhelmi
CEM	0.991 +/- 0.004	0.985 +/- 0.004	0.974 +/- 0.004		0.978 +/- 0.006
NonIsol CEM	0.996 +/- 0.004	0.990 +/- 0.003	0.981 +/- 0.003		0.984 +/- 0.006
Loose CEM	1.001 +/- 0.002	1.003 +/- 0.002	0.996 +/- 0.002		0.996 +/- 0.004
NonIsol Loose CEM	1.004 +/- 0.002	1.004 +/- 0.002	0.998 +/- 0.002		0.998+/- 0.003
PHX (|Etal < 2.0)	0.929 +/- 0.006	0.943 +/- 0.006	0.937 +/- 0.006		0.917+/- 0.010
PHX (|Etal < 2.8)	0.937 +/- 0.006	0.952 +/- 0.006	0.959 +/- 0.007	0.929 +/- 0.009	0.936+\-0.010
PEM (|Etal < 2.0)	0.936 +/- 0.004	0.941 +/- 0.004	0.930 +/- 0.004		0.922 +/- 0.007
PEM (|Etal < 2.8)	0.939 +/- 0.004	0.941 +/- 0.004	0.926 +/- 0.005	0.922 +/- 0.006	0.919+\-0.007

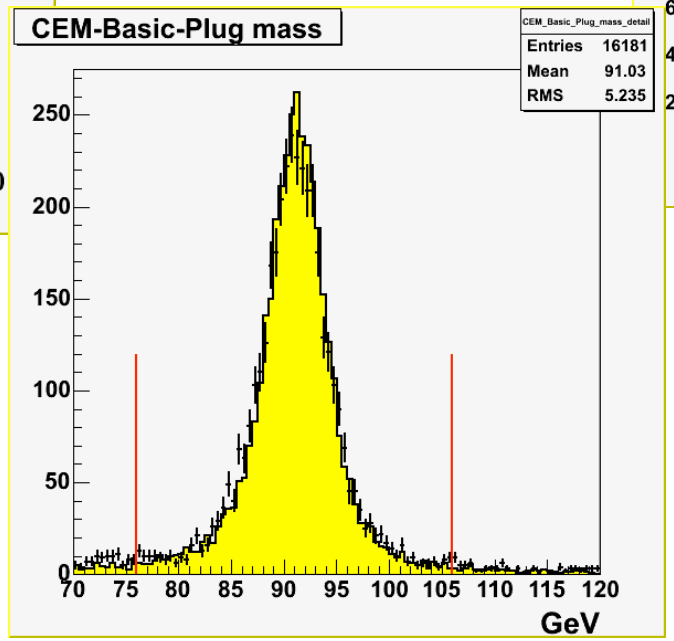
Electron ID Z candidates

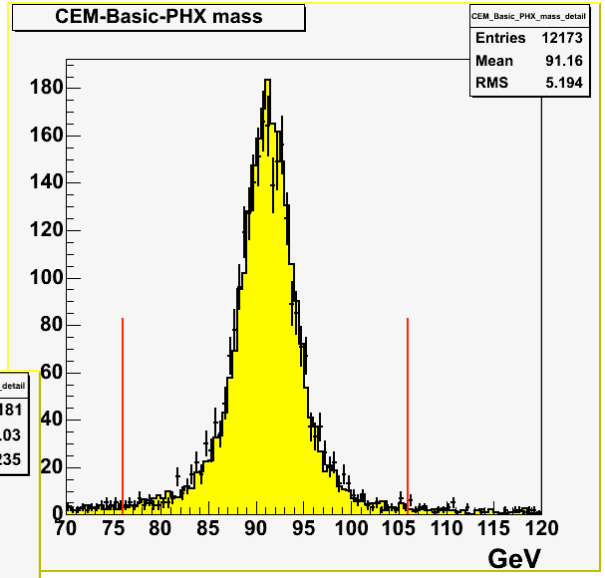




Electron ID Z candidates







Electron Trigger

PerflDia

http://ncdf70.fnal.gov:8001/PerflDia/PerflDia.html

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Home
High ET Electrons
High PT Muons
Medium ET Electrons
Medium PT Muons
Jet Energy Scale
BTagging
Links
Presentations
Validation Module

- Documentation:
  - Web Page (under construction)
  - CDF Note 7939
- Code:
  - Instructions on how to run the code
- Results:
  - Post ShutDown data (June 2006 to September 2006): Runs 217990 to 222426 (MC s zewkcd):
    - Number of events for NoSi GRL
    - Number of events for Si GRL
  - bhel0i Pre SD
  - bhel0h
  - bhel0f

How to run the electron trigger efficiency code on TopNtuple
Preliminary
There are two steps in producing trigger efficiencies (tracking only for the moment):

- First step: a standalone (release dependent code runs on TopNt). Here are the instructions:
  newrel -t 6.1.4 testrel;
  cd testrel;
  addpkg TopMods; setenv USESHLIBS yes ; gmake TopMods.nobin
  addpkg JetUser jetCorr06b
  gmake JetUser.lib LINK_SHARED_ROOT=yes
  cvsroot zoom
  addpkg ZMutility
  addpkg Exceptions
  gmake ZMutility.all USESHLIBS=1
  gmake Exceptions.all USESHLIBS=1
  in the test release add the following files (tar file with them here :
  ana.cc
  ana.hh

Electron Trigger

Summary of central electron trigger

Trigger	Period 8	Period 9
L1_XFT_PT8	0.9631(6)	0.9651(6)
L2_XFT_PT8	0.9993(1)	0.9992(1)
L3 tracking	0.9959(2)	0.9954(2)
Total Tracking	0.9585(7)	0.9598(7)
L1_CEM8	100%	100%
L2_CEM16	$1.00 - 85036e^{-0.71E_t}$	$1/\{1+e^{(-0.5Et-15)}\}$
L3_CEM18	100%	?

Table: Summary of trigger efficiencies for central electrons.

Period 9(PerfIDia)
0.9650(4)
0.99894(7)
0.9951(7)
0.9593(8)
100%
$1/(1+e^{(-0.5Et-13)}\}$
NA

(BoYoung Han)

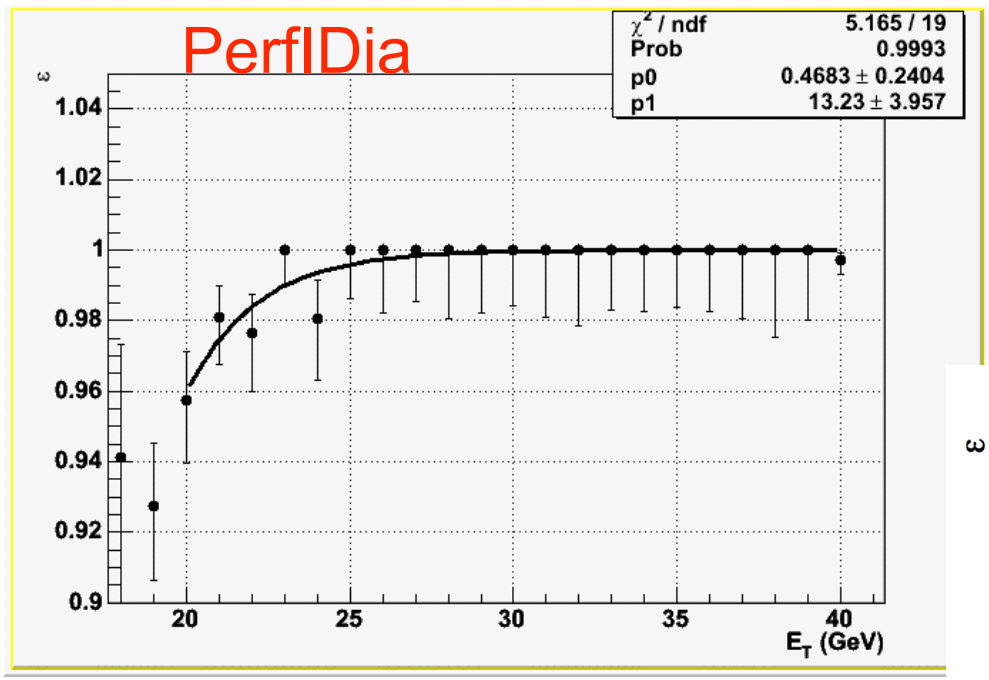
Dataset bhelmi: Runs 222529 to 228596

GRL : goodrun_em_nosi_v15

Complete lists of files used here:

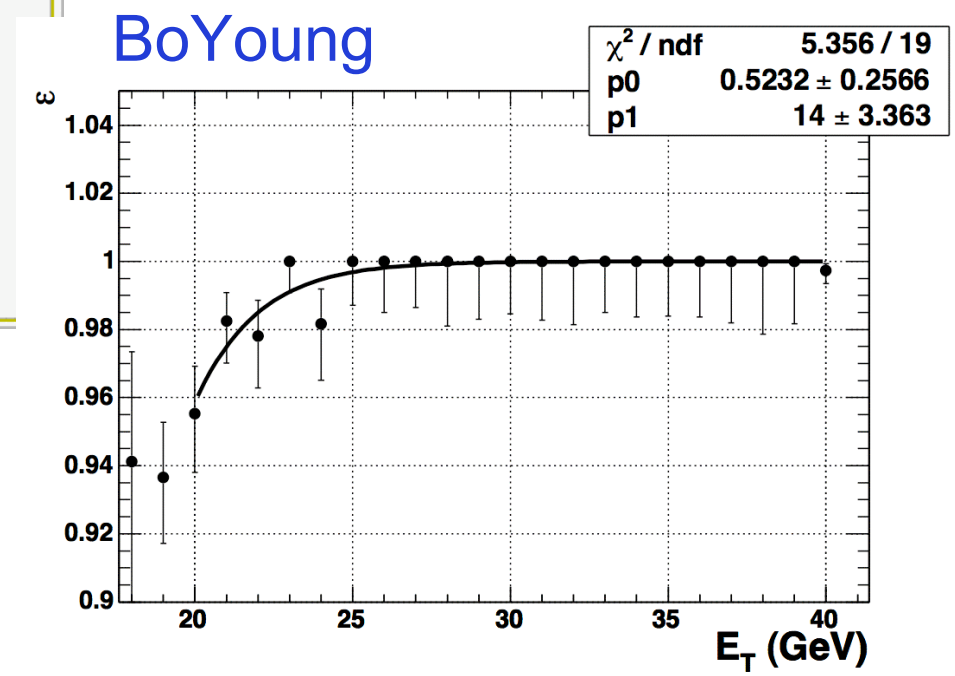
http://ncdf70.fnal.gov:8001/PerfIDia/validation/bhelmi/bhelmi_fieb26.rootlist

Electron Trigger



L2_CEM16 calo efficiency

$1/[1+\exp(-p0E_t - p1)]$



Muons

PerflDia

http://ncdf70.fnal.gov:8001/PerflDia/PerflDia.html

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- Home
- High ET Electrons
- High PT Muons
- Medium ET Electrons
- Medium PT Muons
- Jet Energy Scale
- BTagging
- Links
- Presentations
- Validation Module

- Documentation:
  - Web Page
  - CDF Note 8262, June 1st, 2006
  - Post Shutdown data and efficiencies for Winter 2007 (Lepton Group, November 29 2006)
- Code:
  - Instructions on how to run the code
- Results (PRELIMINARY) :
  - Period 9 Data : Runs 222529 to 228596)
    - Root file of distributions
    - Efficiencies TeX file
  - Post Shut Down Data (June 2006 to September 2006): Runs 217990 to 222426
    - Root file of distributions
    - Efficiencies TeX file
  - Pre Shut Down Data (September 2005 to June 2006): Runs 203819 to 212133
    - Root file of distributions
    - Efficiencies TeX file
  - bhmu0h (December 2004 to September 2005): Runs 190697 to 203799
    - Root file of distributions
    - Efficiencies TeX file
  - bhmu0d bhel0d (2002 to August 2004) : Runs 138425 to 186598
    - Root file of distributions
    - Efficiencies TeX file

How to run the muon efficiency code on TopNtuple
The code lives in CVS (from the head of the repository) under /MuonUser/macros/MuonEffTopNt/.
setup a new test release:
source ~cdfsoft/cdf2.cshrc; setup cdfsoft2 6.1.4; newrel -t 6.1.4 newrel; cd newrel;
add from the head MuonUser and TopMods
addpkg -h MuonUser ; addpkg -h TopMods;
go to the area in MuonUser/macros/MuonEffTopNt/ which will be your working area.
cd MuonUser/macros/MuonEffTopNt/ ;

Muons

Dataset bhelmi: Runs 222529 to 228596
MC sample : zewkcm
GRL : goodrun_em_si_cmxignored.v15

Complete list used here:
http://ncdf70.fnal.gov:8001/PerfIDia/validation/bhmumi/bhmumi.rootlist
http://ncdf70.fnal.gov:8001/PerfIDia/validation/bhmumi/zewkcm.rootlist

ID Efficiencies

Cut	Count	Efficiency (%)
No cut	2777	
E_{EM} cut	2703	97.34 ± 0.31
E_{HAD} cut	2731	98.34 ± 0.24
COT hits cut	2775	99.93 ± 0.05
d_0 cut	2763	99.50 ± 0.13
Isolation cut	2690	96.87 ± 0.33
Δx_{CMU} cut	2770	99.75 ± 0.10
Δx_{CMP} cut	2722	98.02 ± 0.26
All above cuts	2510	90.39 ± 0.56
All cuts excl. isol.	2584	93.05 ± 0.48
Sliding isol. cut	2720	97.95 ± 0.27
All cuts (sliding isol.)	2538	91.39 ± 0.53
χ^2 cut	2777	100.00 ± 0.00
All cuts (χ^2)	2510	90.39 ± 0.56
All track cuts	2568	92.47 ± 0.50
All trk cuts excl. isol.	2645	95.25 ± 0.40

TABLE I: Dataset bhmumi-1: Muon ID efficiencies for CMUP

Cut	Count	Efficiency (%)
No cut	1642	
E_{EM} cut	1599	97.38 ± 0.39
E_{HAD} cut	1607	97.87 ± 0.36
COT hits cut	1642	100.00 ± 0.00
d_0 cut	1638	99.76 ± 0.12
Isolation cut	1593	97.02 ± 0.42
Δx_{CMX} cut	1632	99.39 ± 0.19
All above cuts	1516	92.33 ± 0.66
All cuts excl. isol.	1558	94.88 ± 0.54
Sliding isol. cut	1599	97.38 ± 0.39
All cuts (sliding isol.)	1521	92.63 ± 0.64
χ^2 cut	1642	100.00 ± 0.00
All cuts (χ^2)	1516	92.33 ± 0.66
All track cuts	1523	92.75 ± 0.64
All trk cuts excl. isol.	1565	95.31 ± 0.52

TABLE II: Dataset bhmumi-1: Muon ID efficiencies for CMX

		Efficiency (%)			
		bhmu0d	bhmu0h	bhmu0i	bhmu0i2
CMUP	All above cuts	91.03 ± 0.40	91.09 ± 0.36	89.84 ± 0.47	89.53 ± 0.58
	All cuts excl. isol.	92.93 ± 0.36	93.51 ± 0.31	92.73 ± 0.41	92.34 ± 0.51
CMX	All above cuts	93.52 ± 0.49	91.75 ± 0.44	92.27 ± 0.52	92.22 ± 0.66
	All cuts excl. isol.	95.21 ± 0.42	94.38 ± 0.36	94.23 ± 0.45	94.08 ± 0.58

ID Efficiencies MC

Cut	Count	Efficiency (%)
No cut	196	
E_{EM} cut	185	94.39 ± 1.64
E_{HAD} cut	196	100.00 ± 0.00
COT hits cut	196	100.00 ± 0.00
d_0 cut	196	100.00 ± 0.00
Isolation cut	194	98.98 ± 0.72
Δx_{CMU} cut	196	100.00 ± 0.00
Δx_{CMP} cut	192	97.96 ± 1.01
All above cuts	179	91.33 ± 2.01
All cuts excl. isol.	181	92.35 ± 1.90
Sliding isol. cut	194	98.98 ± 0.72
All cuts (sliding isol.)	179	91.33 ± 2.01
χ^2 cut	196	100.00 ± 0.00
All cuts (χ^2)	179	91.33 ± 2.01
All track cuts	183	93.37 ± 1.78
All trk cuts excl. isol.	185	94.39 ± 1.64

TABLE I: Dataset zewkcm-1: Muon ID efficiencies for CMUP

Cut	Count	Efficiency (%)
No cut	151	
E_{EM} cut	146	96.69 ± 1.46
E_{HAD} cut	149	98.68 ± 0.93
COT hits cut	151	100.00 ± 0.00
d_0 cut	151	100.00 ± 0.00
Isolation cut	148	98.01 ± 1.14
Δx_{CMX} cut	151	100.00 ± 0.00
All above cuts	141	93.38 ± 2.02
All cuts excl. isol.	144	95.36 ± 1.71
Sliding isol. cut	149	98.68 ± 0.93
All cuts (sliding isol.)	142	94.04 ± 1.93
χ^2 cut	151	100.00 ± 0.00
All cuts (χ^2)	141	93.38 ± 2.02
All track cuts	141	93.38 ± 2.02
All trk cuts excl. isol.	144	95.36 ± 1.71

TABLE II: Dataset zewkcm-1: Muon ID efficiencies for CMX

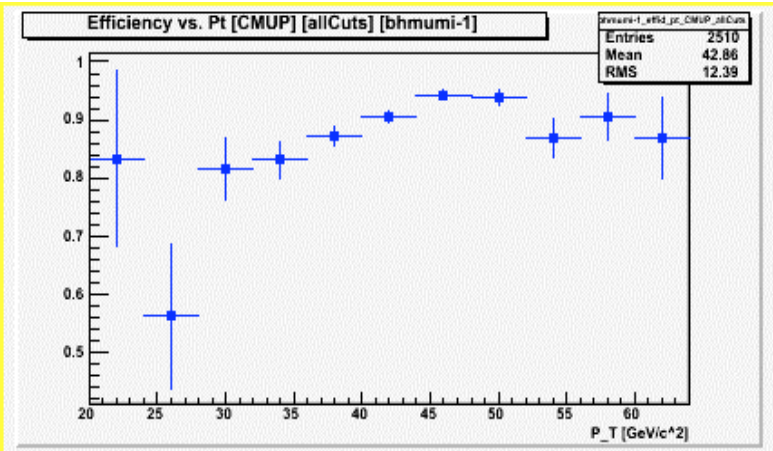
SF	CMUP	CMX
All Cuts	0.9897	0.9887
All Cuts excl isol	1.007	0.9949

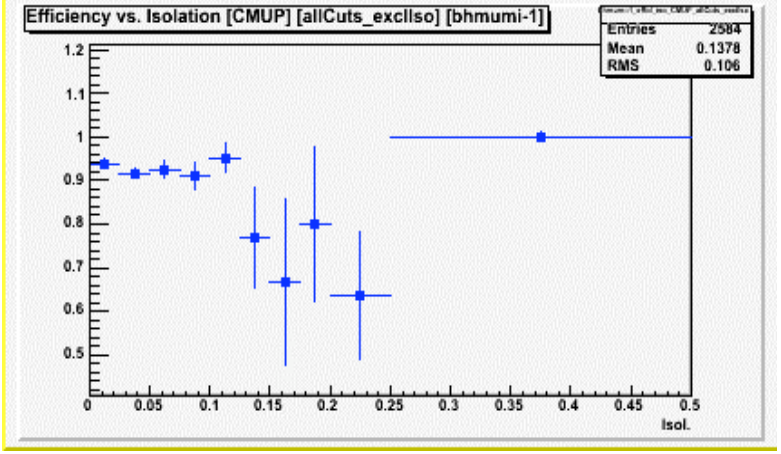
Muons: ID Efficiencies

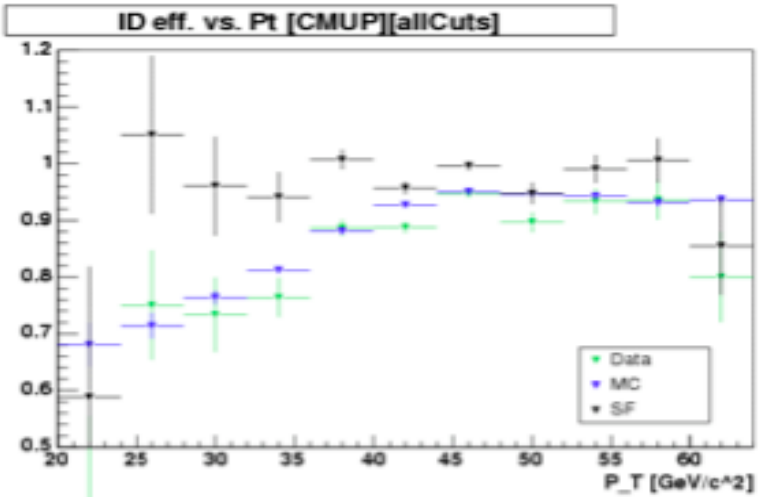
bhmumi

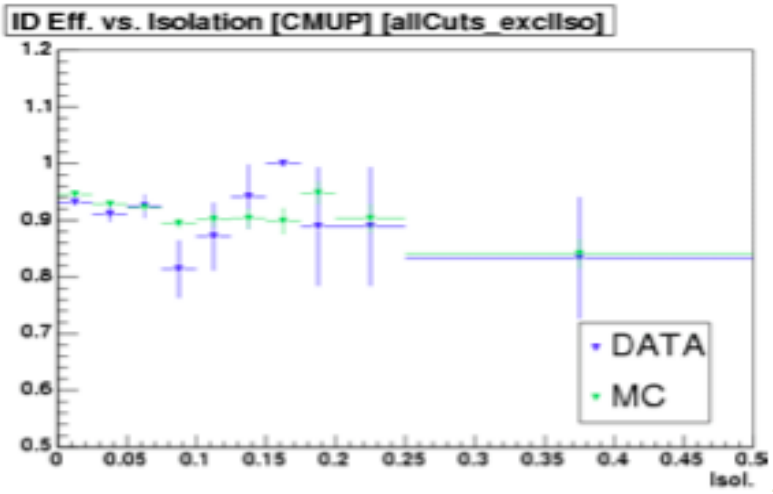
CMUP

bhmu0i2



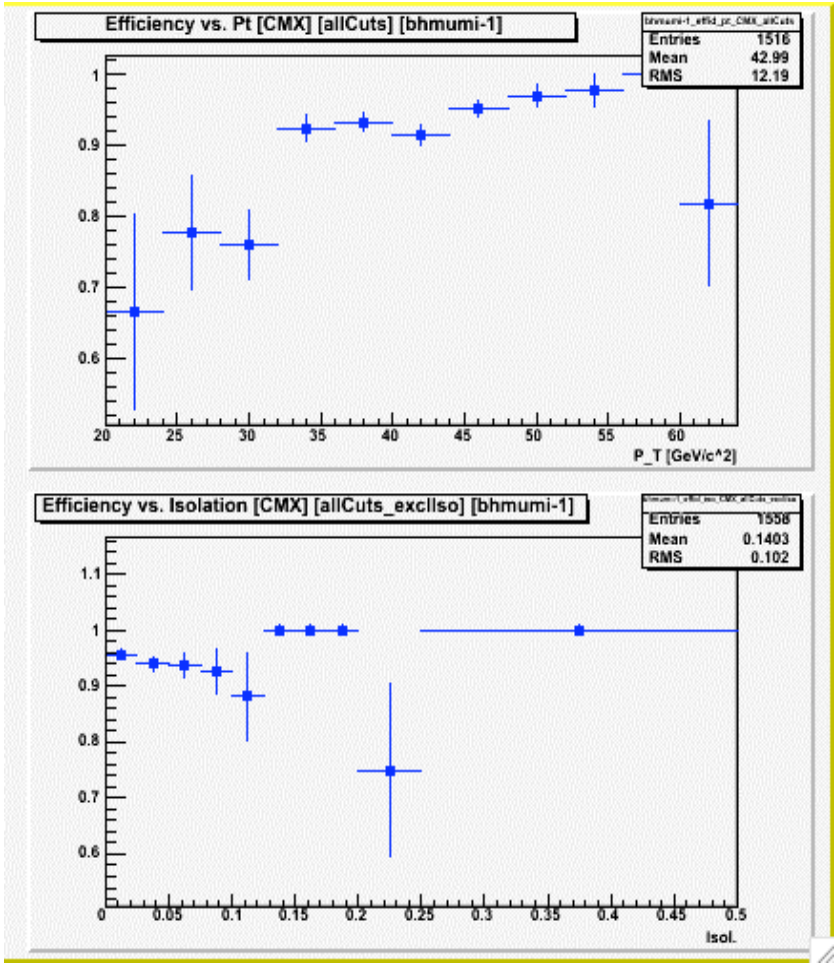






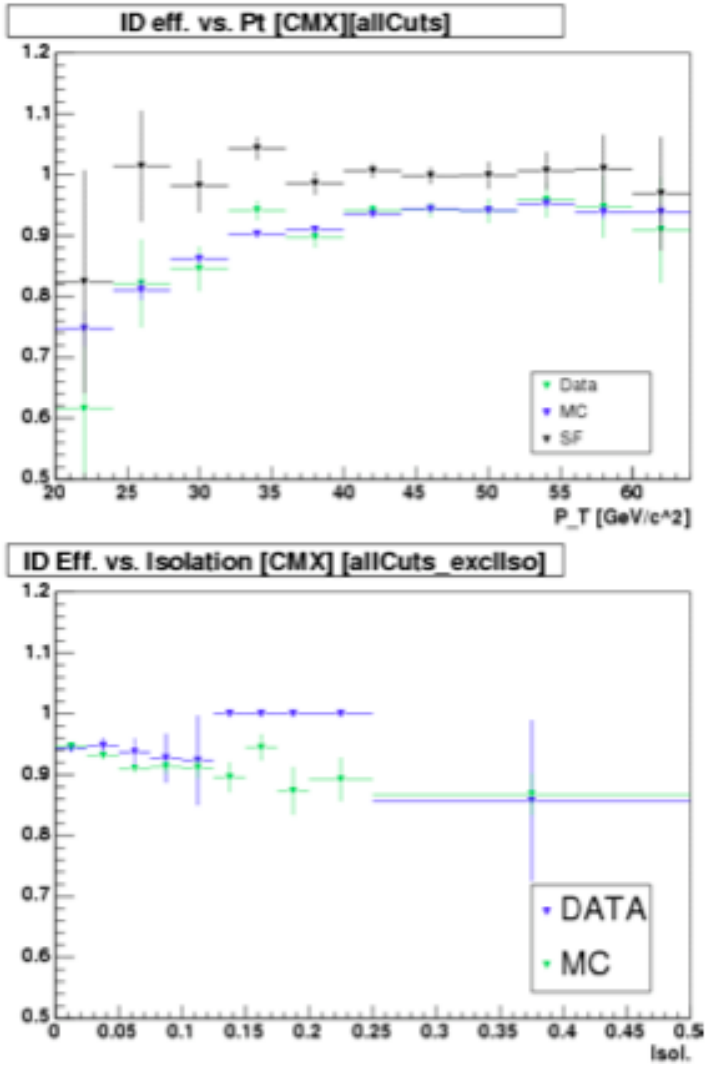
Muons: ID Efficiencies

bhmumi



CMX

bhmu0i2



Muons: Trigger Eff

Level 1

	Efficiency (%)			
	bhmu0d	bhmu0h	bhmu0i	bhmu0i2
CMUP	90.49 ± 0.42	93.03 ± 0.33	92.80 ± 0.41	92.57 ± 0.51
CMX	96.77 ± 0.35	89.39 ± 0.49	89.36 ± 0.60	88.90 ± 0.77
Arches	96.77 ± 0.35	96.06 ± 0.35	95.57 ± 0.45	95.15 ± 0.58
Mini./Key.		77.36 ± 1.39	74.75 ± 1.83	75.98 ± 2.25

bhmumi

1st leg	2nd leg	1st passes	both pass	Efficiency (%)
CMUP	CMUP	918	830	-
CMX	CMUP	1026	948	94.21 ± 0.45
CMUP	CMX	1060	948	-
CMX	CMX	359	272	88.49 ± 0.79
CMUP	ARCH	856	814	-
CMUP	MK	204	134	
ARCH	ARCH	251	217	-
ARCH	MK	86	44	
MK	ARCH	46	44	94.53 ± 0.62
MK	MK	20	11	75.53 ± 2.43

TABLE XI: Dataset bhmumi-1: Muon L1 trigger efficiencies

Muons: Trigger Eff

Level 3

	Efficiency (%)			
	bhmu0d	bhmu0h	bhmu0i	bhmu0i2
CMUP	99.62 ± 0.16	98.79 ± 0.23	98.91 ± 0.27	98.63 ± 0.38
CMX	99.87 ± 0.09	99.48 ± 0.15	99.79 ± 0.12	99.47 ± 0.24
Arches	99.87 ± 0.09	99.41 ± 0.18	99.83 ± 0.12	99.48 ± 0.26
Mini./Key.		99.76 ± 0.24	99.58 ± 0.42	99.41 ± 0.59

Category	Events Passing	Efficiency (%)
Pass L1	948	-
CMUP	948	100.00 ± 0.00
CMX	948	100.00 ± 0.00
CMUP-CMX	948	-
CMUPA	814	-
CMUPMK	134	-
CMUPARCH	814	100.00 ± 0.00
CMUP-MK	134	100.00 ± 0.00

TABLE XII: Dataset bhmumi-1: Muon L2 trigger efficiencies

bhmumi

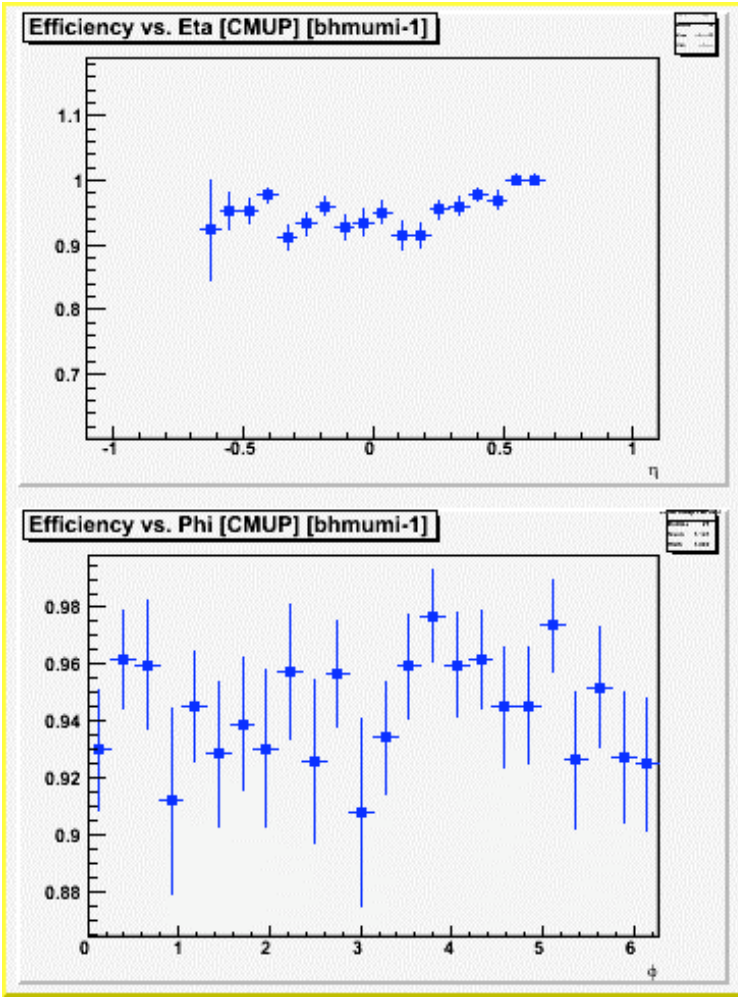
Category	Events Passing	Efficiency (%)
Pass L2	948	-
CMUP	933	98.80 ± 0.45
CMX	582	61.63 ± 1.59
CMUP-CMX	575	-
CMUPA	799	-
CMUPMK	134	-
CMUPARCH	498	62.33 ± 1.71
CMUP-MK	77	57.46 ± 4.27

TABLE XIII: Dataset bhmumi-1: Muon L3 trigger efficiencies

changes in the CMX trigger starting period 9…
Wrong path picked up. We'll fix this.

Muons: Trigger Eff

mi



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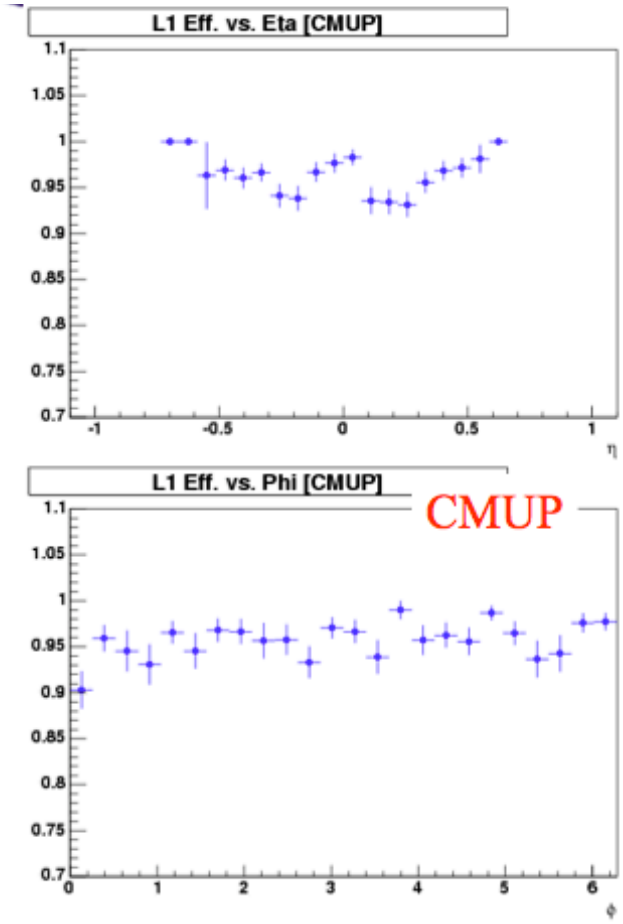
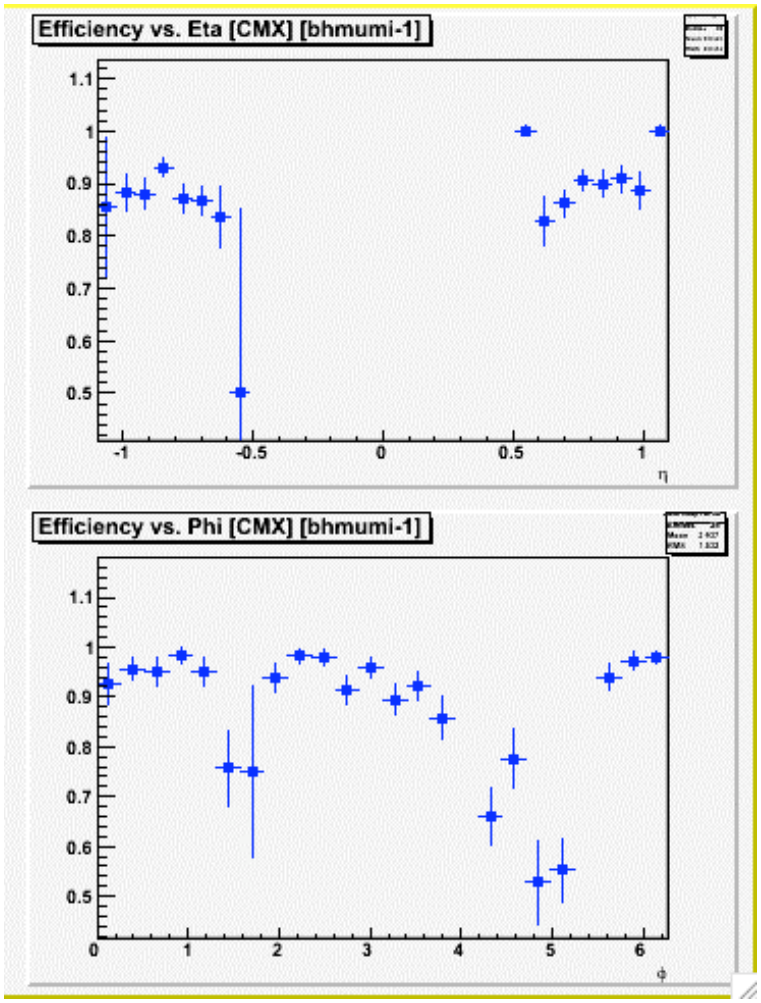


Muons: Trigger Eff

mi



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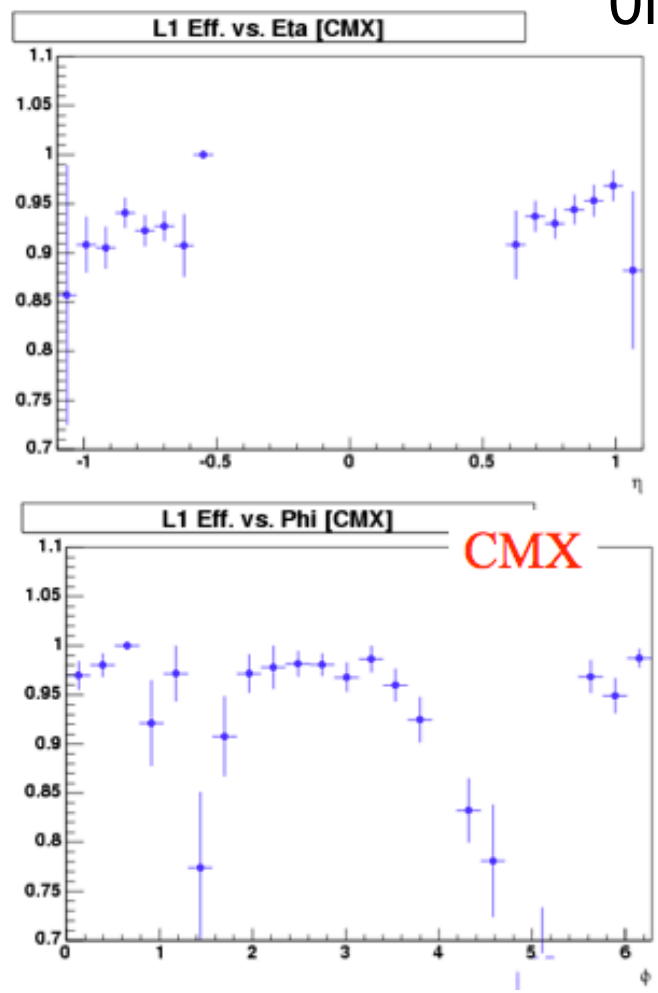


Muons: Reconstruction Eff

Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	2930	2717	92.73 ± 0.48
CMX	1680	1597	95.06 ± 0.53
CMX Arches	1322	1296	98.03 ± 0.38
CMX Miniskirt	296	243	82.09 ± 2.23
CMX Keystone	62	58	93.55 ± 3.12
CMU-only	728	652	89.56 ± 1.13
CMP-only	743	674	90.71 ± 1.06

TABLE X: Dataset bhmumi-1: Muon reconstruction efficiencies

	Efficiency (%)			
Category	bhmu0d	bhmu0h	bhmu0i	bhmu0i2
CMUP	92.71 ± 0.35	91.63 ± 0.34	91.78 ± 0.42	93.04 ± 0.47
CMX	99.36 ± 0.16	97.47 ± 0.25	97.39 ± 0.31	96.67 ± 0.44
Arches	99.36 ± 0.16	99.07 ± 0.18	98.68 ± 0.25	98.91 ± 0.29
Miniskirt		92.57 ± 0.94	92.62 ± 1.18	87.96 ± 1.81
Keystone		91.67 ± 2.13	94.50 ± 2.18	95.77 ± 2.39

SF	zewkcm	zewkbm
CMUP	0.937	0.9550
CMX	0.95	0.9703
Arches	0.98	0.9911
MiniSkirts	0.82	0.9024

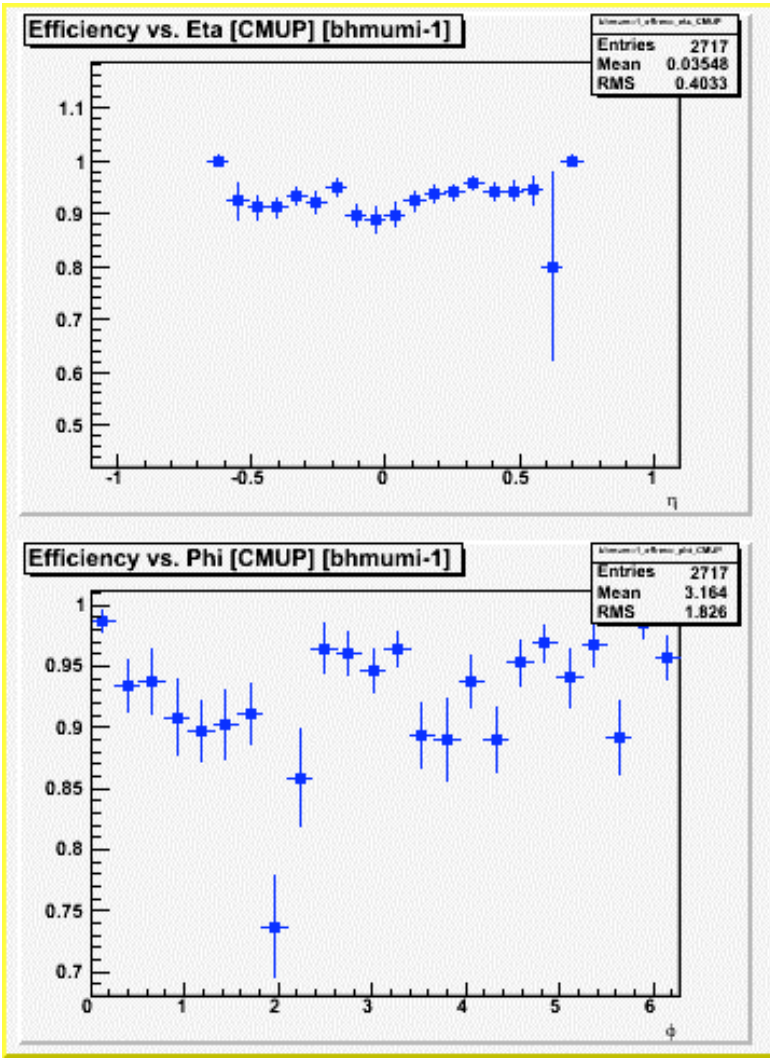
Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	191	189	98.95 ± 0.74
CMX	146	146	100.00 ± 0.00
CMX Arches	145	145	100.00 ± 0.00
CMX Miniskirt	1	1	100.00 ± 0.00
CMX Keystone	0	0	0.00 ± 0.00
CMU-only	51	51	100.00 ± 0.00
CMP-only	86	86	100.00 ± 0.00

TABLE X: Dataset zewkcm-1: Muon reconstruction efficiencies

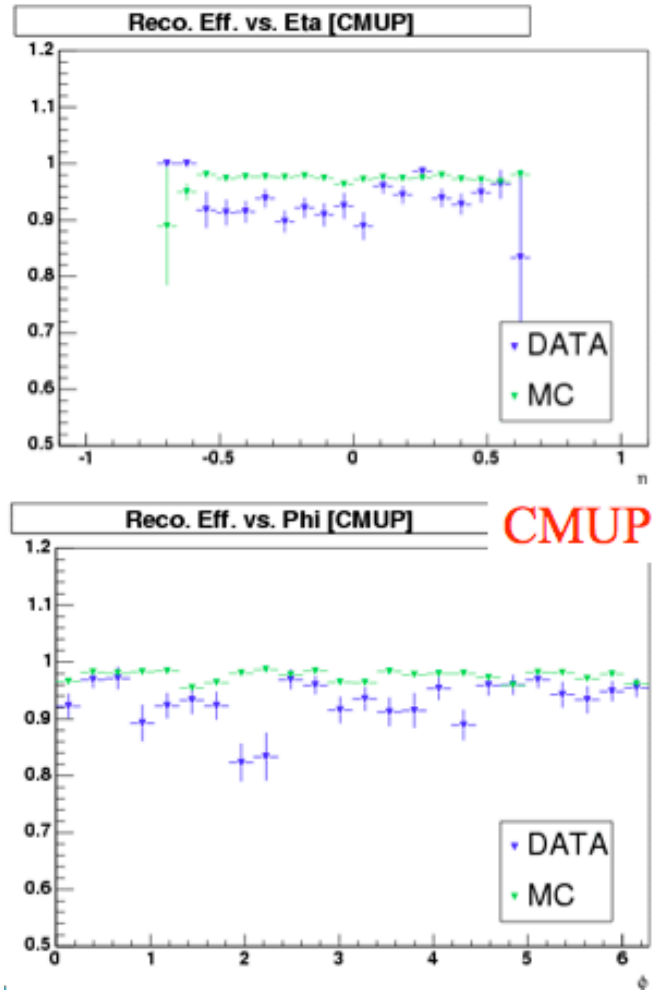
	Efficiency (%)		
Category	zewkam	zewk9m	zewkbm
CMUP	97.53 ± 0.05	97.57 ± 0.03	97.43 ± 0.06
CMX	99.81 ± 0.02	99.61 ± 0.02	99.62 ± 0.03
Arches	99.84 ± 0.02	99.79 ± 0.02	99.80 ± 0.03
Miniskirt		99.06 ± 0.06	99.07 ± 0.12
Keystone		98.99 ± 0.13	98.90 ± 0.26

Muons: Reconstruction Eff

bhmumi

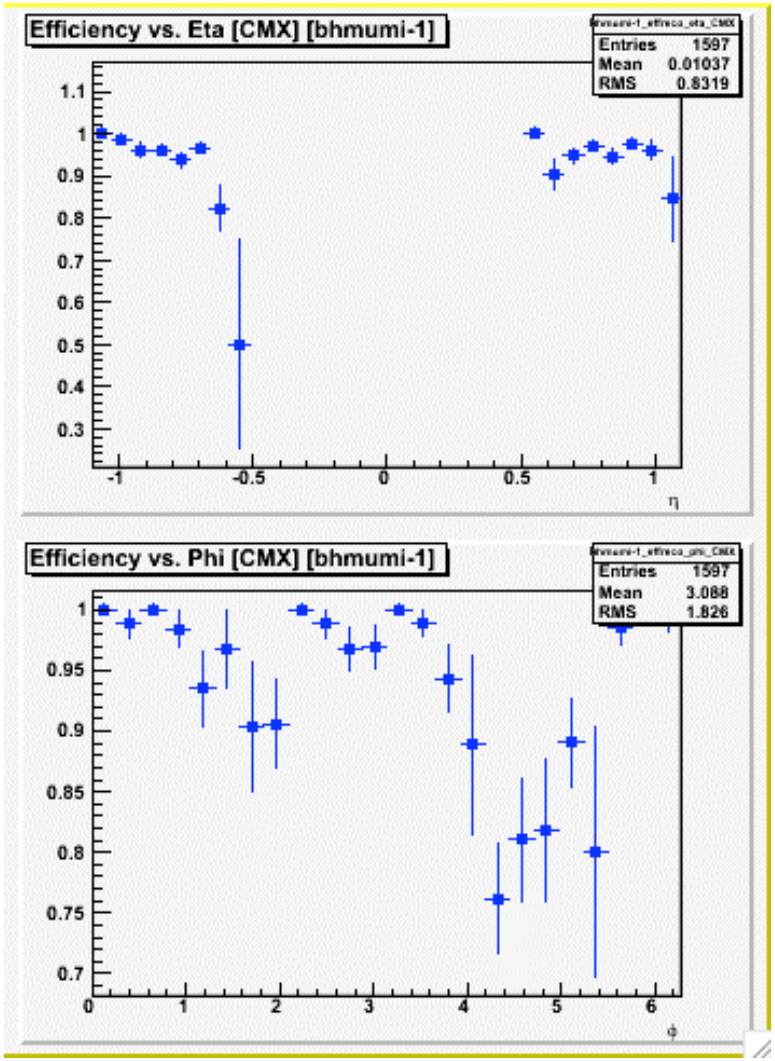


bhmu0i2

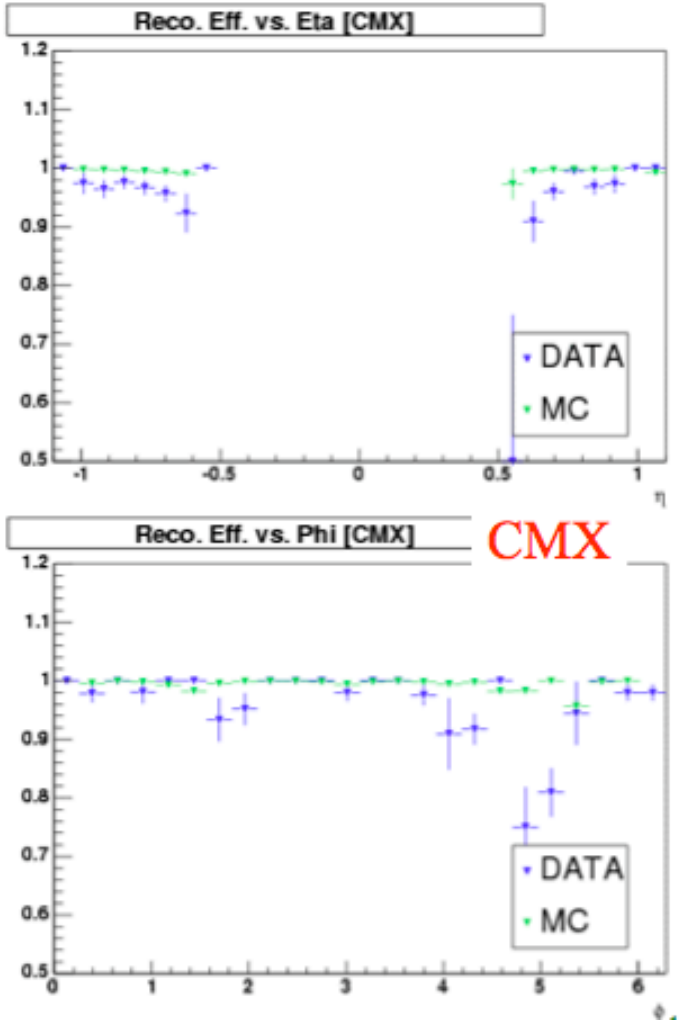


Muons: Reconstruction Eff

bhmumi



bhmu0i2



To Do List for Blessing

- Electrons ID:
  - ok
- Electron Trigger Efficiencies:
  - ok, need calibration dataset (blpc) for L3 calo eff
- Muons:
  - CMX trigger info access
  - MC (and SF) double check
- Should be done by March 23rd!