PerflDia

Simona Rolli

Automation of ID/SF

- Perf(ormance and) ID i(nstant)a(nswer) is meant to
  - To have common code for the analyses sharing the same ID/reco/trigger cuts
    - Provide quickly the SF to apply to MC
  - Check data stability
    - Run the common code from one place as soon as ntuples are ready
- Most of this has been done for a long time
    - Several groups/individuals
    - Not coordinated effort

Automation of ID/SF - caveats

- Not all the analysis share the same ID/SF
  - Especially searches are “tuning” cuts to get the best acceptance/efficiency
    - WZ example
  - It is important to keep diversity
    - Not one size fits all
  - Development/refinement of *new* cuts will still happen!
    - Driven by physics analysis
    - eventually approved by JP

Initial Development

- Automatic tool to check data stability
  - All code in one common place (cvs)
- TopNt and StNtuple produced shortly after Production data is available: target 4-6 weeks
- The ID code is launched to validate the new ntuples and determine the various efficiencies and SF
- Output is posted as plots and tables onto web pages
- Joint Physics group will do the final sign off

Time Line

Data Processing Status

Period	Run-Range	online time	Validation	Release Patch	Dataset	Event numbers / lumi.	Integrated Lumi.	Status	Known Problems
11	233133-237795	31 Jan 07-30 Mar 07	checklist	6.1.1c_f	0j	369M events /264pb-1	2234 pb-1	going strong	
10	228664-233111	24 Nov 06-31 Jan 07	checklist	6.1.1c_f	0i	390M events /280pb-1	1970 pb-1	complete	CEM scale calibration (cache)
9	222529-228596	01 Sep 06 - 22 Nov 06	checklist	6.1.1c_f	0i	250M events /180pb-1	1690 pb-1	complete	WHA calibration (cache)
8	217990-222426	09 Jun 06 - 01 Sep 06	checklist	6.1.1c_e	0i	335M events / 210pb-1	1510 pb-1	complete	Hot WHA Tower (cache)

Ntuple in progress
To be blessed on July 07

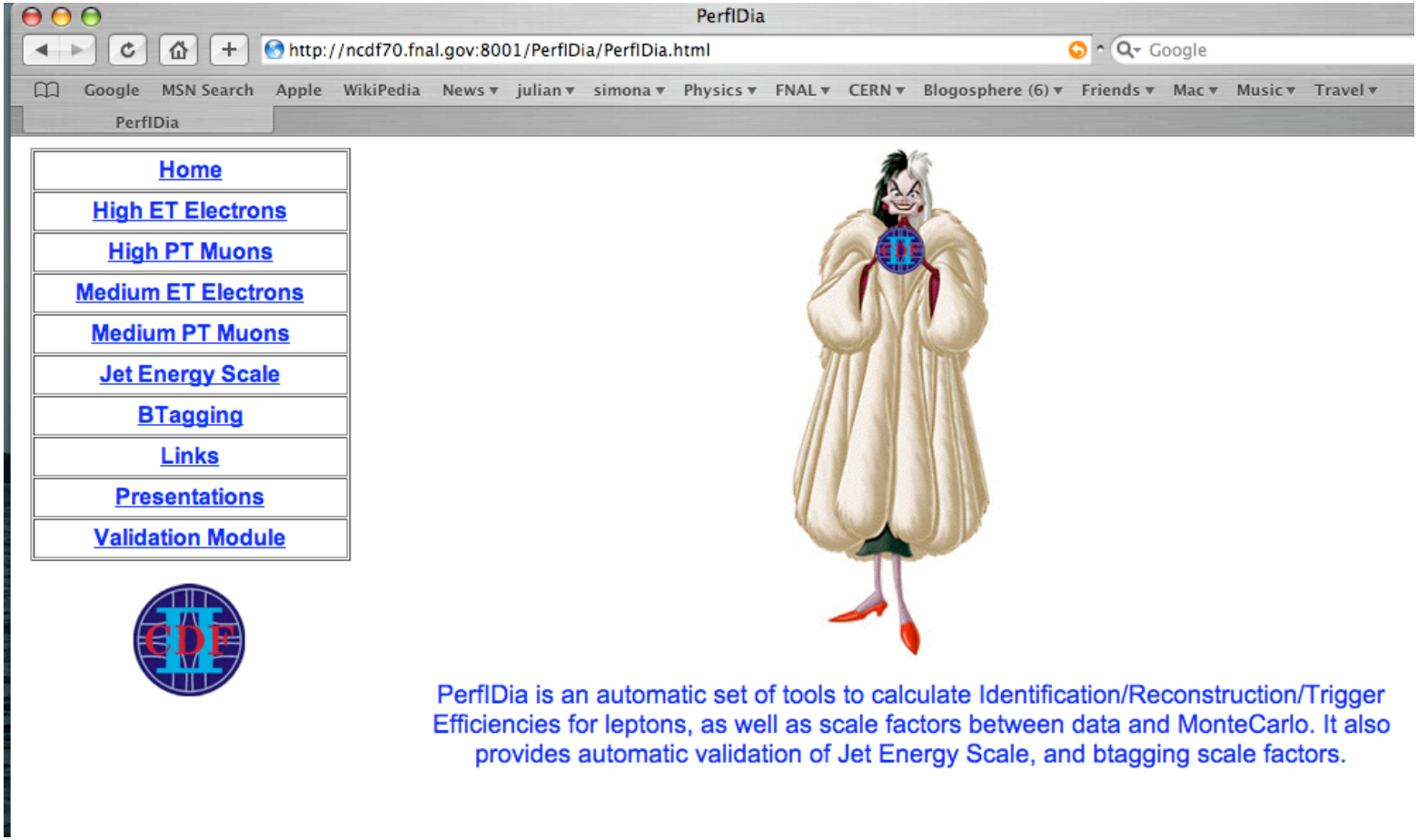
Ntuple ready May 07
June 07 blessed;
Muon Trigger Issues Understood

Ntuple ready Mar 07
May 07 blessed;
Muon Trigger Issues

Ntuple ready Dec 06
Dec 06 blessed;
Used to cross-check code

http://www-cdf.fnal.gov/tiki/tiki-index.php?page=ProductionFarm.DataProcessing

Status



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

Status

- Currently we have validated and produced trigger/reco/id efficiencies and SF for high PT leptons samples (Period 8, Period 9, Period 10):
  - High Et Electron ID (D. Hare, Eva H.)
    - Code put in CVS (ElectronUser)
  - High Et Electron Trigger Eff (BoYoung Han)
    - Code will go into CVS soon
  - High PT Muons (Illinois/Slovakia)
    - Code already in CVS (MuonUser)
- In the future we plan to add:
  - Jet Jet Balancing
    - Code already in CVS (JESstudies)
  - btagging

Status: Electron ID

PerflDia

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

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PerflDia

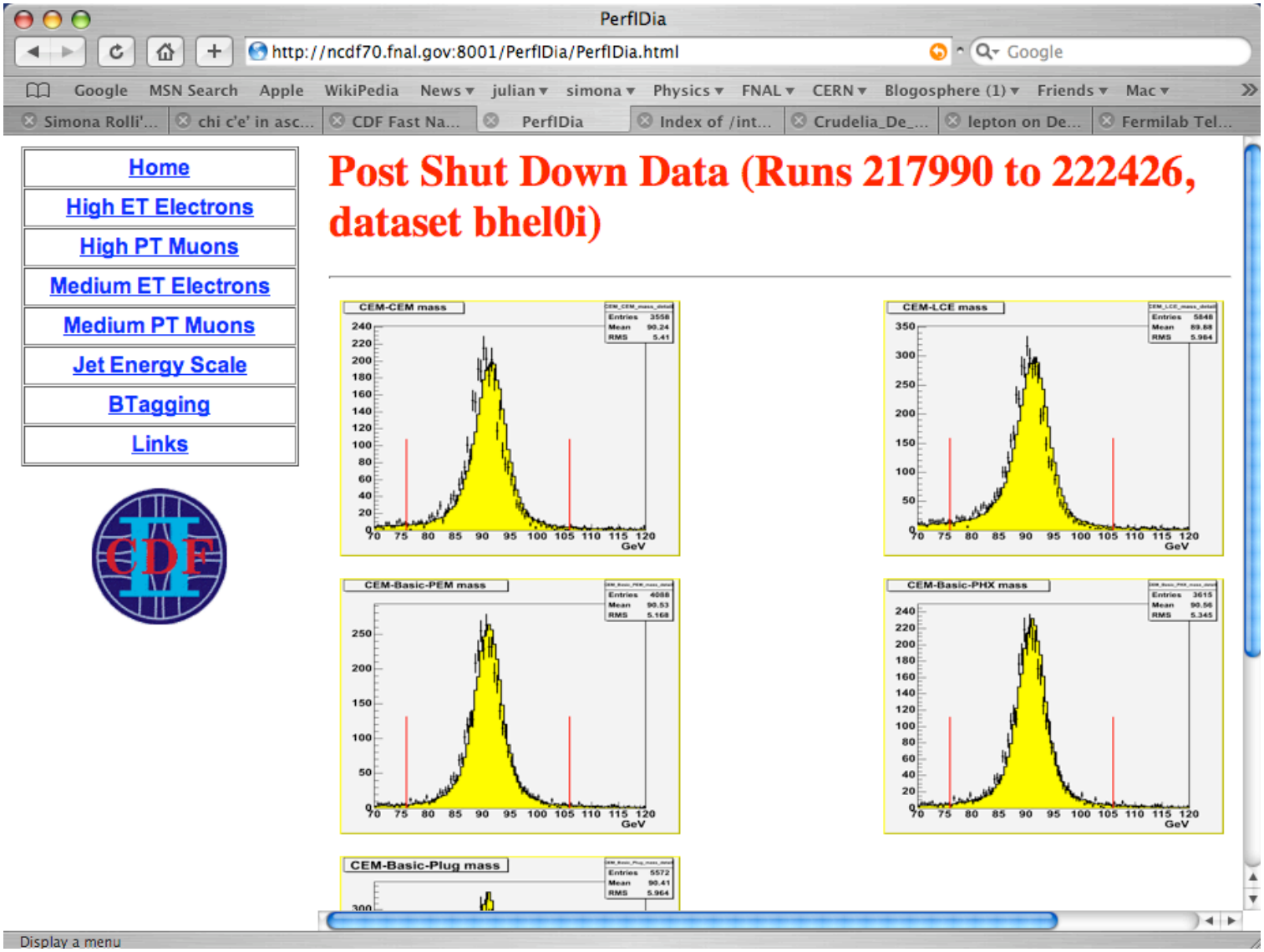
- Home
- High ET Electrons
- High PT Muons
- Medium ET Electrons
- Medium PT Muons
- Jet Energy Scale
- BTagging
- Links
- Presentations
- Validation Module

- 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 - newly reprocessed as zewkmd):
    - Mass distributions with comparisons between data and MC
    - Efficiencies and Scale Factors for data and MC (file not formatted!)
    - Efficiencies and Scale Factors for data and MC at large ETA (eta < 2.8) (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:

Status: Electron ID



Status: Electrons ID

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

CEM Z data counts,

	66-116	71-111	76-106	81-101	86-96
CEM-CEM	5476	5372	5228	5002	4222
CEM-nisoCEM	5692	5576	5421	5168	4342
CEM-looseCEM	6366	6239	6064	5782	4861
CEM-nisolooseCEM	6620	6478	6280	5967	4993
CEM-LCE	7099	6934	6714	6347	5270
CEM-ssCEM	10	8	8	4	2
CEM-ssnisoCEM	12	10	10	6	3
CEM-sslooseCEM	21	19	19	13	10
CEM-ssnisolooseCEM	28	26	23	17	11
CEM-ssnisolooseCEM	28	26	23	17	11
CEM-ssLCE	155	136	112	90	65

CEM Z mc counts,

	66-116	71-111	76-106	81-101	86-96
CEM-CEM	121262	119318	116486	111492	94658
CEM-nisoCEM	125190	123038	119963	114576	96831
CEM-looseCEM	138135	135876	132562	126679	10737
CEM-nisolooseCEM	142884	140354	136715	130332	10990
CEM-LCE	151030	148327	144428	137602	11584
CEM-ssCEM	104	100	94	86	56
CEM-ssnisoCEM	130	122	106	94	60
CEM-sslooseCEM	237	228	216	201	147
CEM-ssnisolooseCEM	227	214	192	176	132
CEM-ssLCE	1213	1156	1068	966	749

CEM bg fractions (%)

	66-116	71-111	76-106	81-101	86-96
CEM-CEM	0.145276 +/- 0.0514694	0.097666 +/- 0.0426179	0.108489 +/- 0.0455		
CEM-nisoCEM	0.16047 +/- 0.0530537	0.120276 +/- 0.0464158	0.144161 +/- 0.05153		
CEM-looseCEM	0.237459 +/- 0.0610021	0.205104 +/- 0.0572774	0.225573 +/- 0.0609		
CEM-nisolooseCEM	0.396136 +/- 0.0772025	0.37333 +/- 0.0757729	0.338706 +/- 0.07331		
CEM-LCE	2.07038 +/- 0.168999	1.77299 +/- 0.158481	1.39303 +/- 0.143035		

Background-subtracted CEM efficiencies (data)

	66-116	71-111	76-106	81-101	86-96
CEM	0.78654+/-0.00486318	0.787947+/-0.00490884	0.788815+/-0.00498114		
nisoCEM	0.817441 +/- 0.00458492	0.817684 +/- 0.00463675	0.817643 +/- 0.00		
looseCEM	0.91353 +/- 0.00333576	0.914131 +/- 0.00336457	0.913881 +/- 0.003		
nisolooseCEM	0.948469 +/- 0.00262391	0.947549 +/- 0.00267723	0.94536 +/- 0.002		

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	≤ 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	-

Electron ID Results:Period 9

Period 8

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

Period 9
0.789 +\- 0.005
0.817+\0.004
0.914 +/- 0.001
0.945 +/- 0.001
0.700 +/- 0.007
0.620 +\-0.006
0.804 +/- 0.006
0.775+\-0.006

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

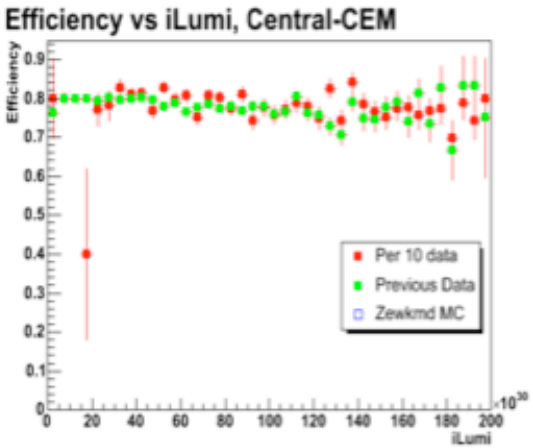
Period 9
0.978 +/- 0.006
0.984 +/- 0.006
0.996 +/- 0.004
0.998+/- 0.003
0.920+/- 0.010
0.936+\-0.010
0.925 +/- 0.007
0.919+\-0.007

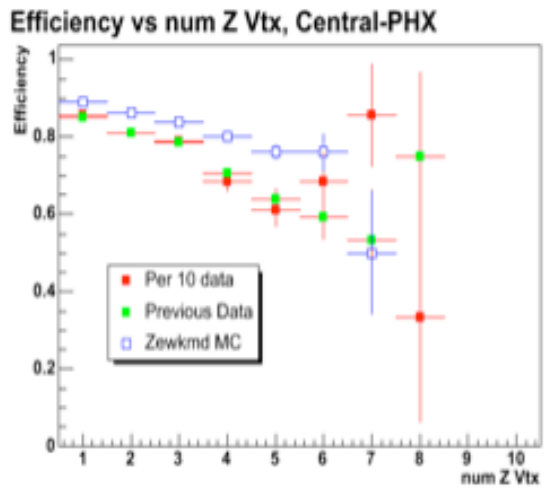
Electron ID: Period 10

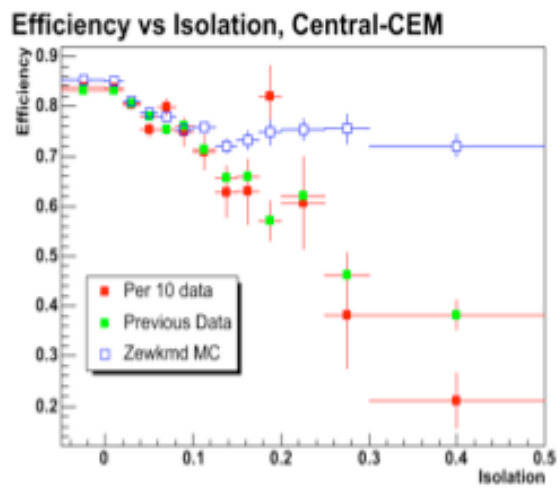
- **Data Set bhelmi (Per10)**
  - Luminosity: 280 pb^{-1}
  - Run Range: 228664 – 233111
  - Date Range: 24 Nov, 06 – 31 Jan, 07
  - Total Integrated Lumi = 1.970 fb^{-1}
- **Compared to Zewkmd MC.**
- **GRL V16 has been applied**

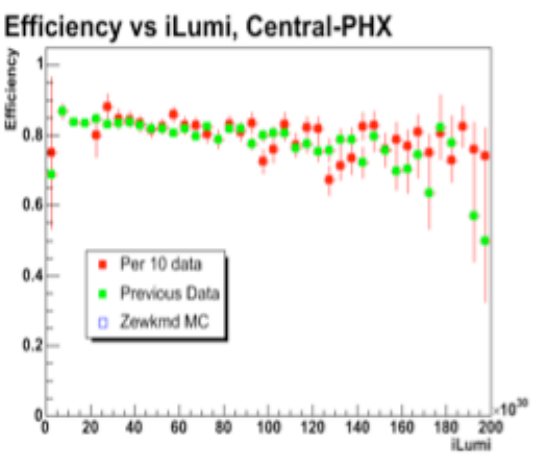
CEM	All errors are statistical only			
	0i Post SD	Per 9	**bhelmi (Per 10)**	MC (Zewkmd)
CEM Eff	0.788 +/- 0.005	0.789 +/- 0.005	0.787 +/- 0.004	0.807 +/- 0.001
CEM SF	0.977 +/- 0.006	0.978 +/- 0.006	0.975 +/- 0.005	N/A
nisoCEM Eff	0.816 +/- 0.004	0.818 +/- 0.005	0.816 +/- 0.004	0.831 +/- 0.001
nisoCEM SF	0.986 +/- 0.005	0.984 +/- 0.006	0.982 +/- 0.005	N/A
looseCEM Eff	0.915 +/- 0.003	0.914 +/- 0.003	0.913 +/- 0.003	0.918 +/- 0.001
looseCEM SF	0.996 +/- 0.004	0.996 +/- 0.004	0.995 +/- 0.003	N/A
nisolooseCEM Eff	0.945 +/- 0.003	0.945 +/- 0.003	0.945 +/- 0.002	0.947 +/- 0.001
nisolooseCEM SF	1.000 +/- 0.003	0.999 +/- 0.003	0.999 +/- 0.003	N/A
PHX				
Eff |Etal < 2.0	0.708 +/- 0.007	0.700 +/- 0.008	0.702 +/- 0.006	0.760 +/- 0.001
SF |Etal < 2.0	0.926 +/- 0.009	0.921 +/- 0.010	0.923 +/- 0.008	N/A
Eff |Etal < 2.8	0.623 +/- 0.006	0.621 +/- 0.006	0.614 +/- 0.005	0.663 +/- 0.001
SF |Etal < 2.8	0.929 +/- 0.009	0.936 +/- 0.010	0.927 +/- 0.008	N/A

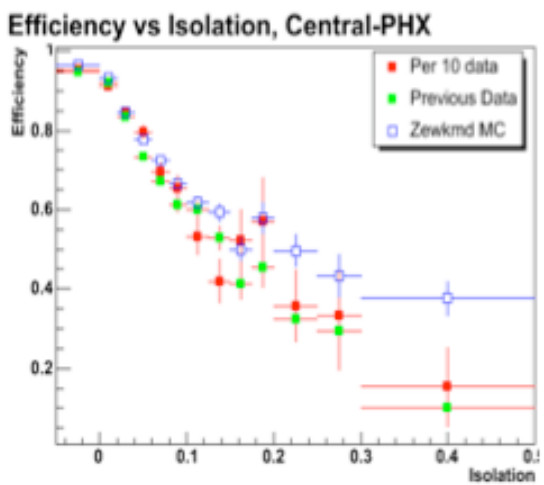
Electron ID: Period 10

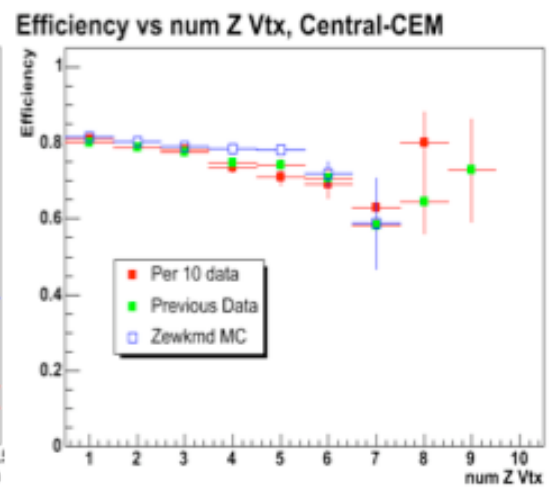












Electron Trigger

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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: 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: Period 9

Summary of central electron trigger

Trigger	Period 8	Period 9	Period 9(PerfIDia)
L1_XFT_PT8	0.9631(6)	0.9651(6)	0.9650(4)
L2_XFT_PT8	0.9993(1)	0.9992(1)	0.99894(7)
L3 tracking	0.9959(2)	0.9954(2)	0.9951(7)
Total Tracking	0.9585(7)	0.9598(7)	0.9593(8)
L1_CEM8	100%	100%	100%
L2_CEM16	$1.00 - 85036e^{-0.71E_t}$	$1/\{1+e^{(-0.5Et-15)}\}$	$1/(1+e^{(-0.5Et-13)}\}$
L3_CEM18	100%	100%	$1/(1+e^{-0.27Et)})$

Table: Summary of trigger efficiencies for central electrons.

(BoYoung Han)

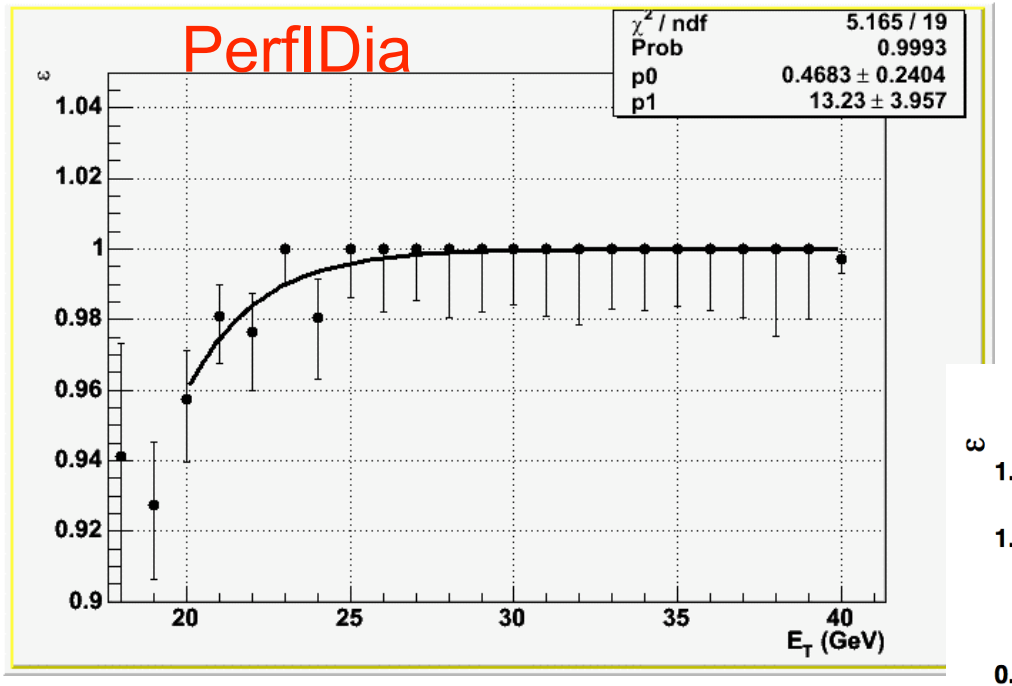
Dataset bhelmi: Runs 222529 to 228596

GRL : goodrun_em_nosi_v15

Complete lists of files used here:

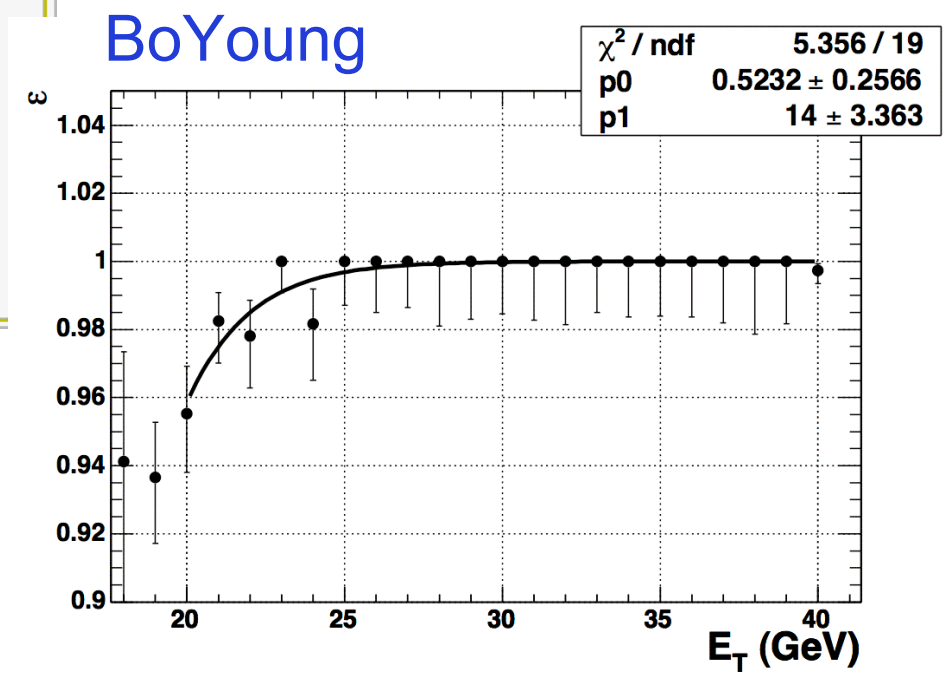
http://ncdf70.fnal.gov:8001/PerfIDia/validation/bhelmi/bhelmi_fieb26.rootlist

Electron Trigger: Period 9



L2_CEM16 calo efficiency

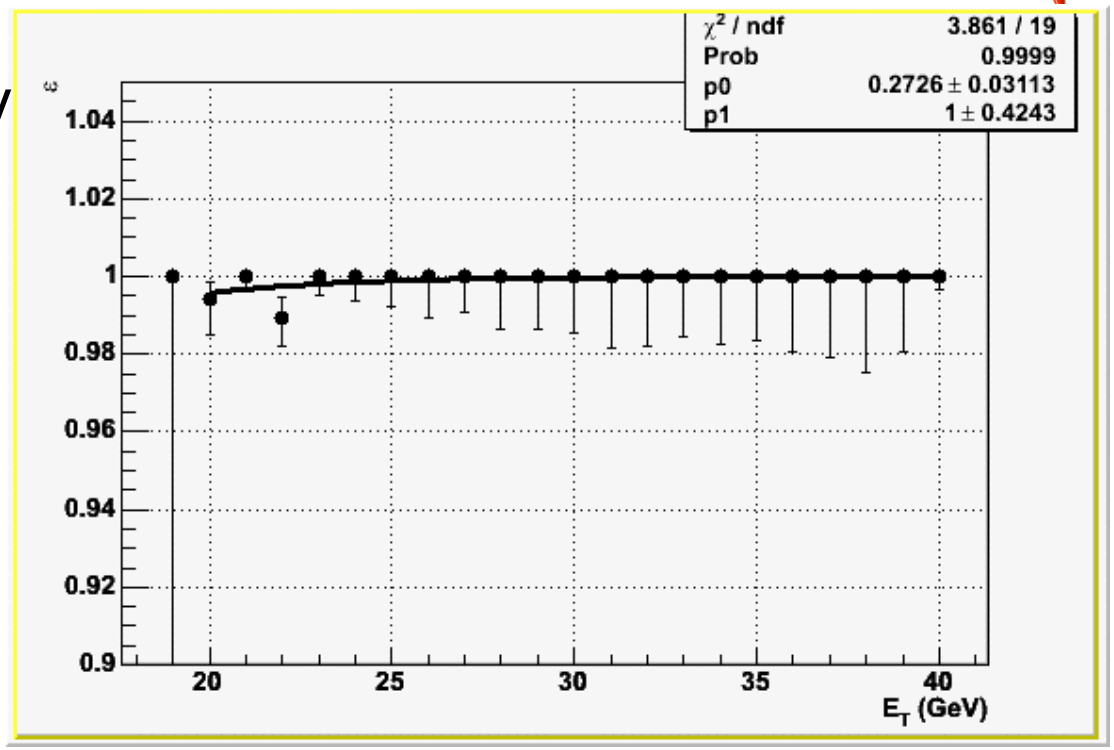
$1/[1+\exp(-p0E_t - p1)]$



Electron Trigger: Period 9

L3_CEM16 calo efficiency

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



Dataset blpcmi: Runs 222529 to 228596

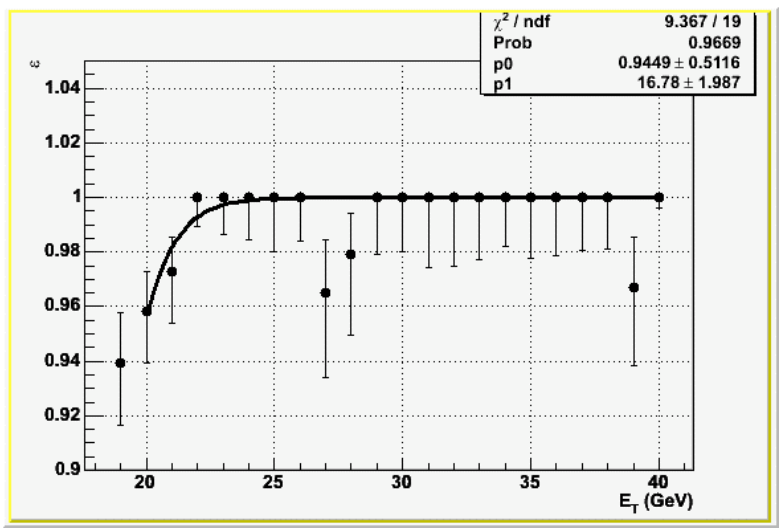
GRL : goodrun_em_nosi_v15

Complete lists of files used here:

http://ncdf70.fnal.gov:8001/PerfIDia/validation/blpcmi/bhlpcmi.rootlist

Electron Trigger: Period 10

Trigger	Period 8	Period 9	Period 10
L1_XFT_PT8	0.9631(6)	0.9650(4)	0.967416
L2_XFT_PT8	0.9993(1)	0.99894(7)	0.99925
L3 tracking	0.9959(2)	0.9951(7)	0.99418
Total Tracking	0.9585(7)	0.9593(8)	0.96107
L1_CEM8	100%	100%	100%
L2_CEM16	$1.00 - 85036e^{-0.71E_t}$	$1/(1+e^{(-0.5Et-13)}\}$	$1/(1+e^{(-0.9Et-63)}\}$
L3_CEM18	100%	$1/(1+e^{-0.27Et})$	In progress



Preliminary

L2_CEM16 calorimeter efficiency

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

Muons

PerfIDia

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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 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/ ;

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

Muons: Period 9

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

The muon triggers were changed during this period and we had to spend quite some time to bring the new experts up to speed with the new definition of trigger efficiency for CMX

-Slight lack of communication in conveying this information

ID/Reco efficiencies were not affected

Period 10 will see the same trigger changes for CMU trigger

- efficiencies being worked on now

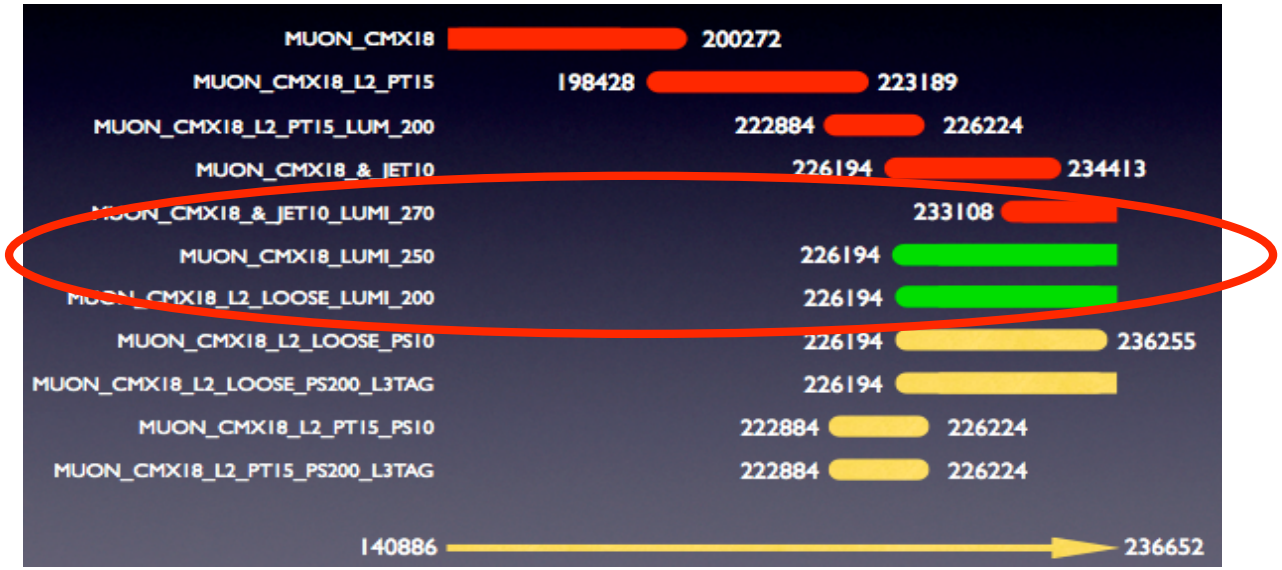
New trigger definition note

Muon Triggers

The CMUP trigger stayed the same
The CMX trigger changed during period 9:
The CMX triggers were divided according to the following paths:

- CMX0: MUON_CMX18_LUMI ("old" CMX w/ SLAM confirmation)
- CMX1: MUON_CMX18_L2_LOOSE_LUMI ("old" CMX w/o SLAM conf)
- CMX1: MUON_CMX18_&_JET (new CMX + JET path)

- Each trigger was analyzed separately in the same fashion as the previous CMX trigger



Trigger Paths

	CMUP18 trigger path
Level 1	L1_CMUP6_PT4
Level 2	L2_AUTO_L1_CMUP6_PT4 (run≤152949) L2_TRK8_L1_CMUP6_PT4(152949<run≤179056) L2_CMUP6_PT8(181013≤run≥202717) L2_CMUP6_PT15(run≥198428)
Level 3	L3_MUON_CMUP18

	OLD CMX18 trigger path
Level 1	L1_CMX_PT8_PS1 (run≤152949) L1_CMX_PT8_CSX(_PS1) (run>152949)
Level 2	L2_AUTO_L1_CMX6_PT8(run≤152949) L2_AUTO_L1_CMX6_PT8_CSX(152525≤run≤179056) L2_AUTO_L1_CMX6_PT10(181013≤run≤202717) L2__L1_CMX6_PT15(run≥198428)
Level 3	L3_MUON_CMX_18

- L1_CMX6_PT8_CSX_v-2/[28(15)]
  - L2_CMX6_PT15_3D_&_JET10_v-1/[55]
    - L3_MUON_CMX18_v-2
      - MUON_CMX18_&_JET10_v-1
        - HIGH_PT_MUON_1_v-16
  - L2_CMX6_PT15_3D_LUMI_250_v-1/[56]
    - L3_MUON_CMX18_v-2
      - MUON_CMX18_LUMI_250_v-1
        - HIGH_PT_MUON_1_v-16
  - L2_CMX6_PT15_LUMI_200_v-1/[57(4)]
    - L3_MUON_CMX18_v-2
      - MUON_CMX18_L2_LOOSE_LUMI_200_v-1
        - HIGH_PT_MUON_1_v-16

L1 Trigger Efficiency

ε^{L1}_{CMUP} is calculated from 2 independent samples

1)CMX-CMUP where the triggered leg is CMX and the probe leg is CMUP

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

2)CMUP-CMUP sample

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

From which the efficiency is derived

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

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

Trigger Eff L1

Period 9

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

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

L3 Trigger Efficiency

CMX-CMUP events events where both legs pass the L1 trigger

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

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

MUON_CMX18_L2_LOOSE_LUMI

- L1_CMX6_PT8_CSX_v-2/[28(15)]
  - L2_CMX6_PT15_3D_&_JET10_v-1/[55]
    - L3_MUON_CMX18_v-2
      - MUON_CMX18_&_JET10_v-1
        - HIGH_PT_MUON_1_v-16
  - L2_CMX6_PT15_3D_LUMI_250_v-1/[56]
    - L3_MUON_CMX18_v-2
      - MUON_CMX18_LUMI_250_v-1
        - HIGH_PT_MUON_1_v-16
  - L2_CMX6_PT15_LUMI_200_v-1/[57(4)]
    - L3_MUON_CMX18_v-2
      - MUON_CMX18_L2_LOOSE_LUMI_200_v-1
        - HIGH_PT_MUON_1_v-16

No SLAM conf

Category	Events Passing	Efficiency (%)
Pass L2	948	-
CMUP	315	98.70 ± 0.65
CMX	308	96.51 ± 1.03
CMUP-CMX	304	-
CMUPA	272	-
CMUPMK	43	-
CMUPARCH	262	96.32 ± 1.14
CMUP-MK	42	97.67 ± 2.30

TABLE XIII: Dataset bhmumiCMX1-1: Muon L3 trigger efficiencies

MUON_CMX18_LUMI

- L1_CMX6_PT8_CSX_v-2/[28(15)]
  - L2_CMX6_PT15_3D_&_JET10_v-1/[55]
    - L3_MUON_CMX18_v-2
      - MUON_CMX18_&_JET10_v-1
        - HIGH_PT_MUON_1_v-16
  - L2_CMX6_PT15_3D_LUMI_250_v-1/[56]
    - L3_MUON_CMX18_v-2
      - MUON_CMX18_LUMI_250_v-1
        - HIGH_PT_MUON_1_v-16
  - L2_CMX6_PT15_LUMI_200_v-1/[57(4)]
    - L3_MUON_CMX18_v-2
      - MUON_CMX18_L2_LOOSE_LUMI_200_v-1
        - HIGH_PT_MUON_1_v-16

SLAM confirmation

Category	Events Passing	Efficiency (%)
Pass L2	948	-
CMUP	315	98.64 ± 0.67
CMX	295	92.38 ± 1.49
CMUP-CMX	291	-
CMUPA	272	-
CMUPMK	43	-
CMUPARCH	249	91.54 ± 1.69
CMUP-MK	42	97.67 ± 2.30

TABLE XIII: Dataset bhmumiCMX0-1: Muon L3 trigger efficiencies

MUON_CMX18_&_JET10_LUMI

L1_CMX6_PT8_CSX_v-2/[28(15)]

- L2_CMX6_PT15_3D_&_JET10_v-1/[55]
  - L3_MUON_CMX18_v-2
    - MUON_CMX18_&_JET10_v-1
      - HIGH_PT_MUON_1_v-16
- L2_CMX6_PT15_3D_LUMI_250_v-1/[56]
  - L3_MUON_CMX18_v-2
    - MUON_CMX18_LUMI_250_v-1
      - HIGH_PT_MUON_1_v-16
- L2_CMX6_PT15_LUMI_200_v-1/[57(4)]
  - L3_MUON_CMX18_v-2
    - MUON_CMX18_L2_LOOSE_LUMI_200_v-1
      - HIGH_PT_MUON_1_v-16

Category	Events Passing	Efficiency (%)
Pass L2	948	-
CMUP	41	100.00 ± 0.00
CMX	40	97.56 ± 2.41
CMUP-CMX	40	-
CMUPA	34	-
CMUPMK	7	-
CMUPARCH	33	97.06 ± 2.90
CMUP-MK	7	100.00 ± 0.00

TABLE XXVI: Dataset bhmumiCMX2-1: Muon L3 trigger efficiencies

MUON_CMX18_&_JET10_LUMI

Efficiency as function of jet Et cut

Category	Efficiency
Et > 10 GeV	75.00 ± 4.97
Et > 13 GeV	90.57 ± 4.02
Et > 14 GeV	93.75 ± 3.49
Et > 15 GeV	97.56 ± 2.41
Et > 20 GeV	96.55 ± 3.39
Et > 25 GeV	100 ± 0.0
Et > 30 GeV	100 ± 0.0

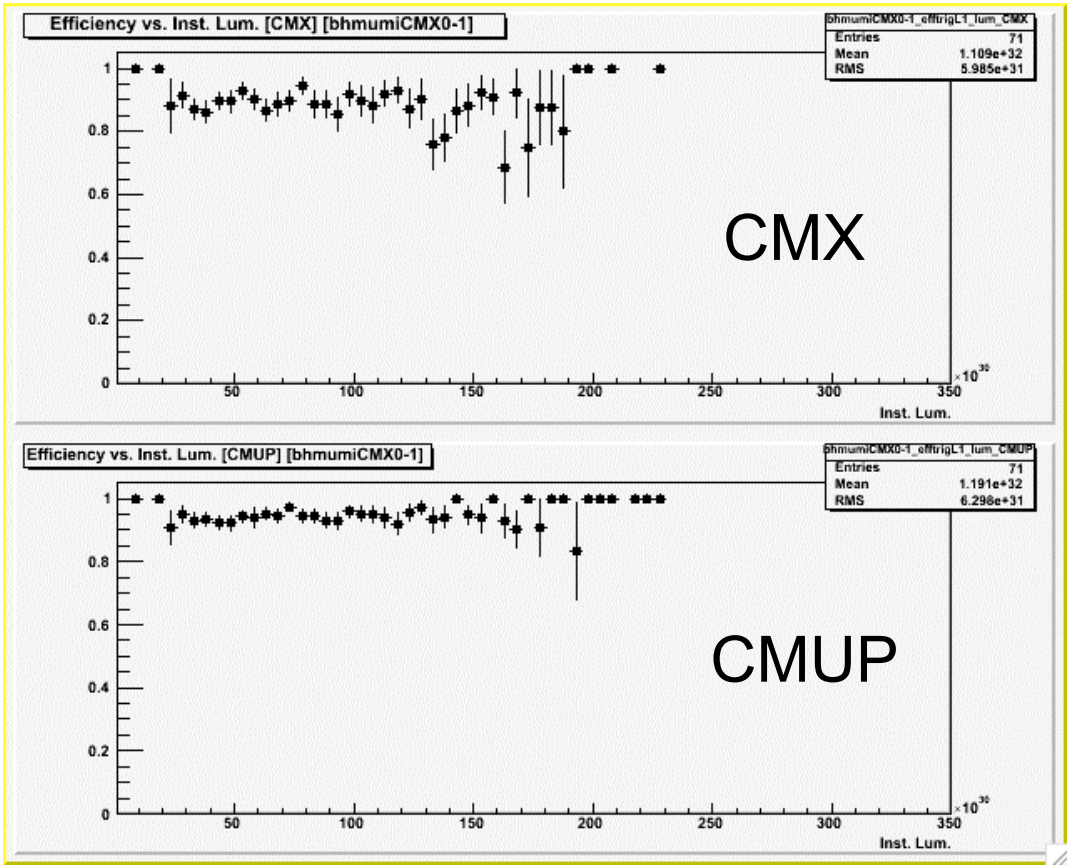
Conclusions on Trigger Eff

The right way to proceed is to start calculating the L2 trigger efficiency, since it is at L2 that we have implemented the new requirements (3D confirmation and jet).
We are doing it.
In this way L3 efficiency will be 100% relative to L2 which is what now we quoted as L3.

Preliminary results are indicating that the L2 efficiency for the SLAM confirmed CMX trigger is of order 97%

Trigger Eff vs Inst Luminosity

L1 Trigger Efficiency vs Inst Lumi



Overall Trigger Efficiency

The overall trigger efficiency is the product of L1xL2xL3 (for now L1xL3)

Category	L1	L3 CMX18 no 3D	Overall	L3 CMX18 3D	Overall	L3 CMX18 & Jet10	Overall
CMUP	94.21 ± .45	98.70 ± .65	93.01± 0.79	98.64 ± 0.67	92.92 ± 0.79	100 ± 0	94.21±.45
CMX18 no 3D	88.49 ± .79	96.51 ± 1.03	85.40 ± 1.29				
CMX18 3d	88.49 ± 0.79			92.38 ± 1.49	81.74 ± 2.58		
CMX18 & Jet10	88.49 ± .79					97.56± 2.41	86.33 ±2.5
Arch	94.53 ± .62	96.32 ± 1.14	91.05 ±1.29	91.54 ± 1.69	86.53 ±1.70	97.06± 2.90	91.75±2.95
MK	75.53 ± 2.43	97.67 ± 2.30	73.77 ±2.30	97.67 ± 2.30	73.77 ±2.30	100 ± 0	75.53±2.43

	Efficiency (%)			
	bhmu0d	bhmu0h	bhmu0i	bhmu0i2
CMUP	90.15 ± 0.44	91.91 ± 0.39	91.79 ± 0.48	91.30 ± 0.61
CMX	96.65 ± 0.36	88.92 ± 0.51	89.17 ± 0.61	88.43 ± 0.79
Arches	96.65 ± 0.36	95.50 ± 0.39	95.41 ± 0.46	94.67 ± 0.63
Mini./Key.		77.18 ± 1.40	74.44 ± 1.85	75.54 ± 2.28

Period 8

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.

ID Efficiencies: data

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 (zewkcm)

Cut	Count	Efficiency (%)
No cut	59264	
E_{EM} cut	57021	96.22 ± 0.08
E_{HAD} cut	58264	98.31 ± 0.05
COT hits cut	59261	99.99 ± 0.00
d_0 cut	59185	99.87 ± 0.01
Isolation cut	57627	97.24 ± 0.07
Δx_{CMU} cut	59256	99.99 ± 0.00
Δx_{CMP} cut	58927	99.43 ± 0.03
All above cuts	54221	91.49 ± 0.11
All cuts excl. isol.	55673	93.94 ± 0.10
Sliding isol. cut	57877	97.66 ± 0.06
All cuts (sliding isol.)	54446	91.87 ± 0.11
χ^2 cut	59264	100.00 ± 0.00
All cuts (χ^2)	54221	91.49 ± 0.11
All track cuts	54532	92.02 ± 0.11
All trk cuts excl. isol.	55997	94.49 ± 0.09

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

Cut	Count	Efficiency (%)
No cut	37280	
E_{EM} cut	35907	96.32 ± 0.10
E_{HAD} cut	36488	97.88 ± 0.07
COT hits cut	37279	100.00 ± 0.00
d_0 cut	37235	99.88 ± 0.02
Isolation cut	36323	97.43 ± 0.08
Δx_{CMX} cut	37216	99.83 ± 0.02
All above cuts	34193	91.72 ± 0.14
All cuts excl. isol.	35041	93.99 ± 0.12
Sliding isol. cut	36465	97.81 ± 0.08
All cuts (sliding isol.)	34319	92.06 ± 0.14
χ^2 cut	37280	100.00 ± 0.00
All cuts (χ^2)	34193	91.72 ± 0.14
All track cuts	34253	91.88 ± 0.14
All trk cuts excl. isol.	35103	94.16 ± 0.12

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

Period 9

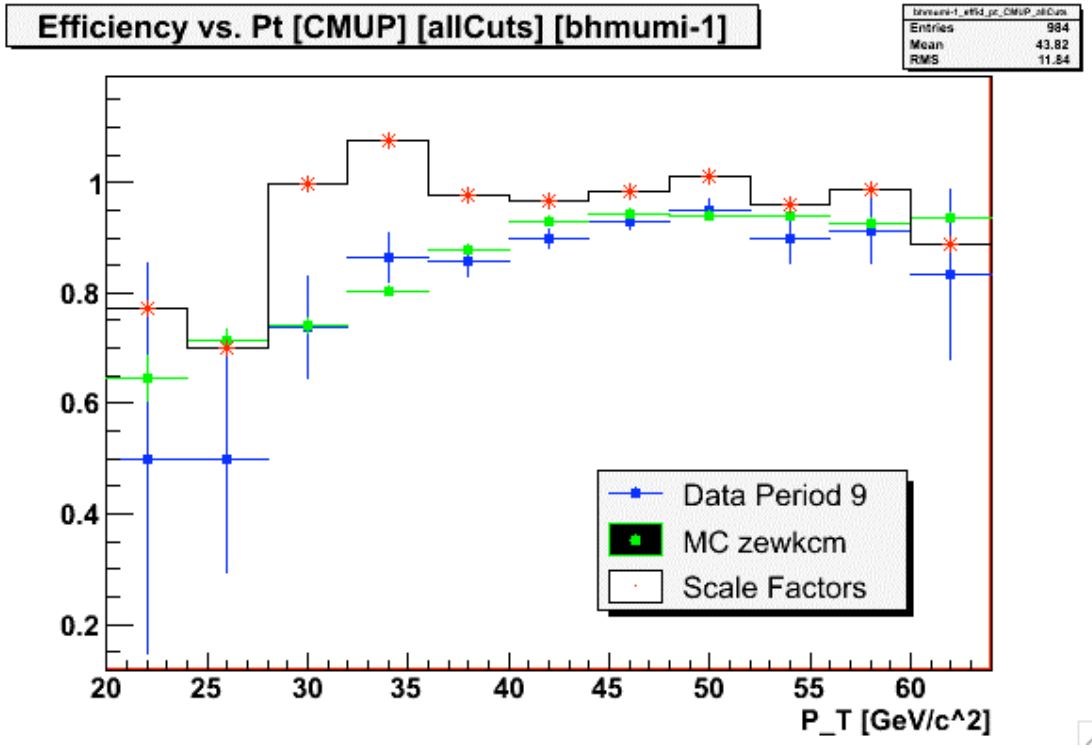
SF	CMUP	CMX
All Cuts	0.9882 ± 0.0062	0.9955 ± 0.0041
All Cuts excl isol	0.9908 ± 0.0052	1.0099 ± 0.0059

Period 8

	Factor	
Category	bhmu0i	bhmu0i2
CMUP	0.9753 ± 0.0052	0.9751 ± 0.0064
Excl. isol.	0.9854 ± 0.0044	0.9821 ± 0.0055
Sliding isol.	0.9804 ± 0.0050	0.9776 ± 0.0063
CMX	1.0012 ± 0.0057	1.0001 ± 0.0073
Excl. isol.	1.0010 ± 0.0049	0.9989 ± 0.0063
Sliding isol.	1.0020 ± 0.0056	1.0028 ± 0.0070

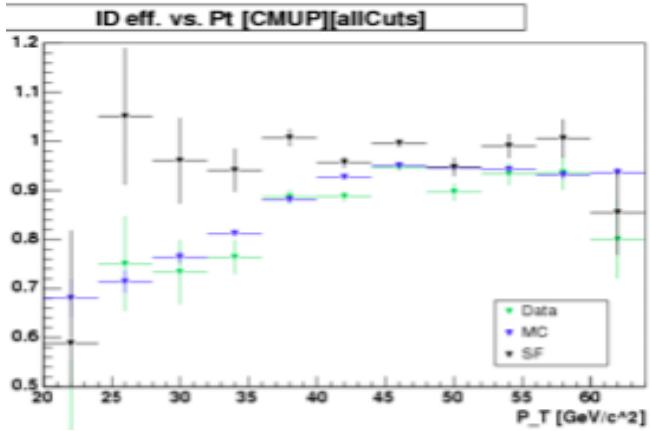
Muons: ID Efficiencies

CMUP



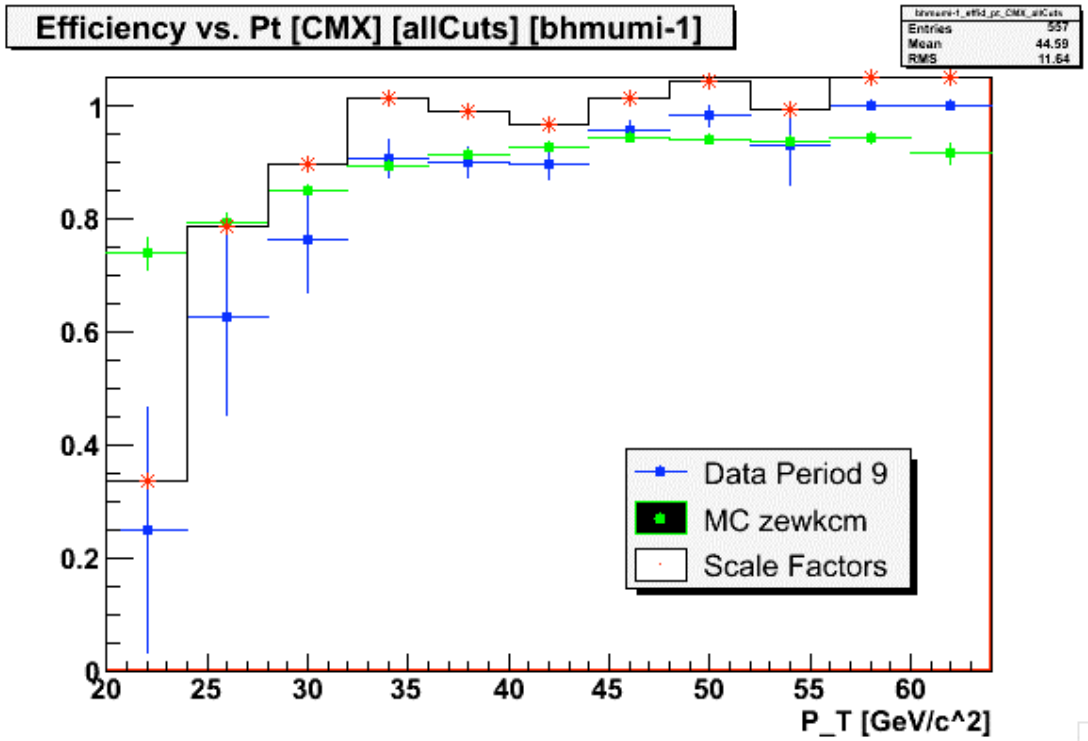
Period 9

Period 8



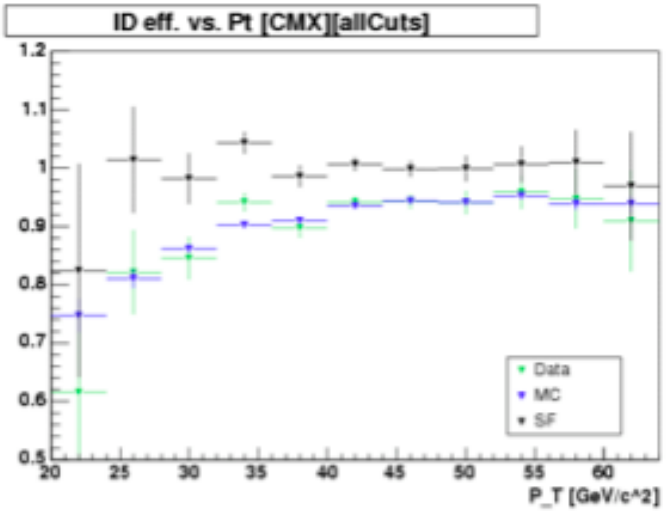
Muons: ID Efficiencies

CMX



Period 9

Period 8



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

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

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

Category	Scale Factor
CMUP	0.9518 ± 0.0050
CMX	0.9537 ± 0.0053
CMX Arches	0.9822 ± 0.0039
CMX Miniskirt	0.8265 ± 0.0225
CMX Keystone	0.9478 ± 0.0317
CMU-only	0.9173 ± 0.0117
CMP-only	0.9234 ± 0.0108
CMX MiniKey	0.8475 ± 0.0196

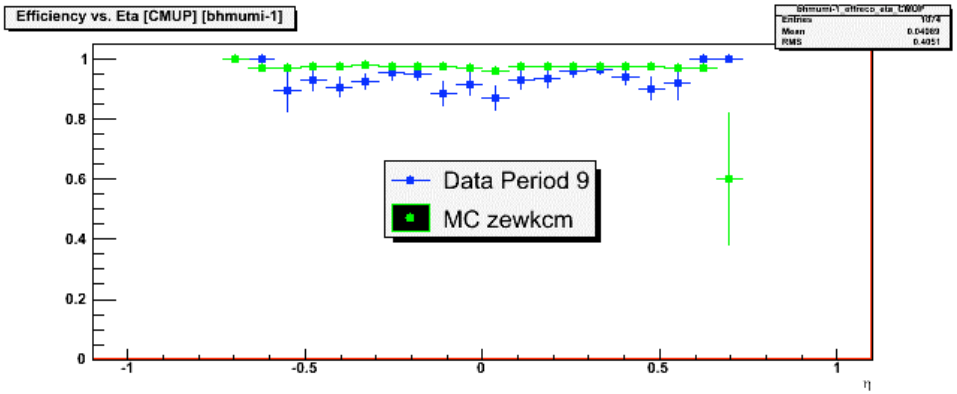
Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	58947	57426	97.42 ± 0.07
CMX	36213	36086	99.65 ± 0.03
CMX Arches	27747	27692	99.80 ± 0.03
CMX Miniskirt	6853	6802	99.26 ± 0.10
CMX Keystone	1613	1592	98.70 ± 0.28
CMU-only	13547	13225	97.62 ± 0.13
CMP-only	16909	16631	98.36 ± 0.10

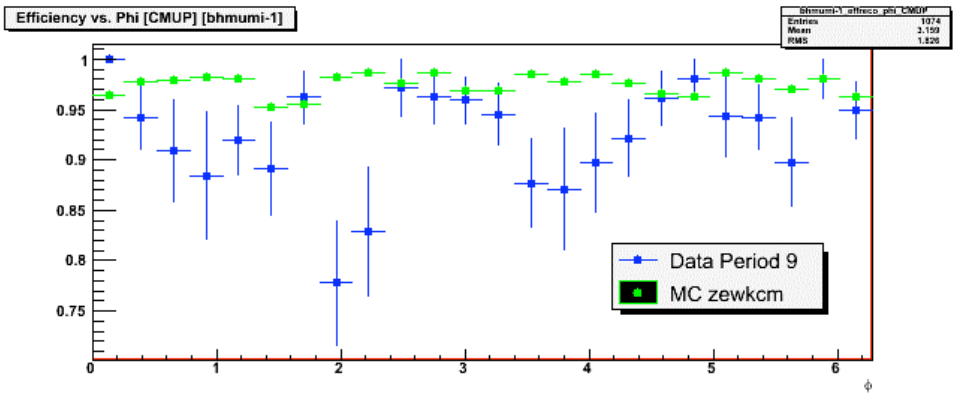
TABLE X: Dataset zewkcm-1: Muon reconstruction efficiencies

	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

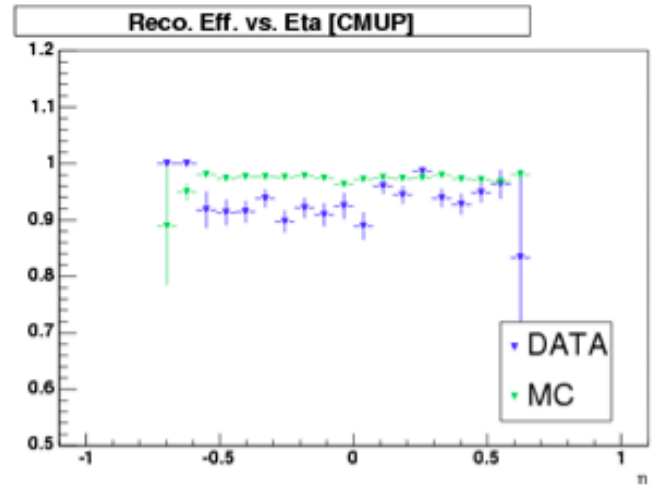
Muons: Reconstruction Eff

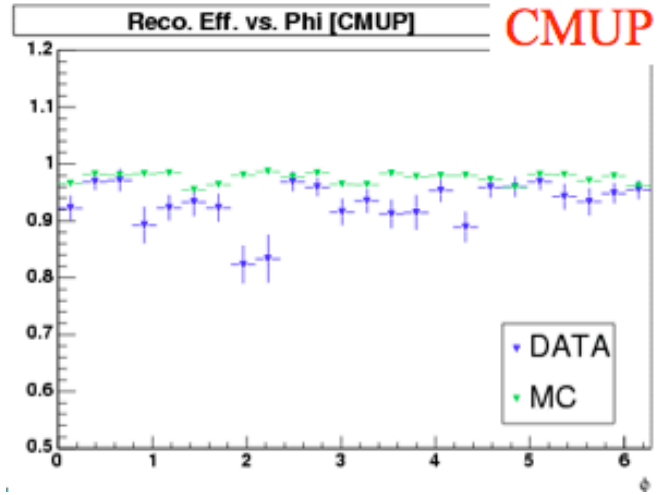
Period 9





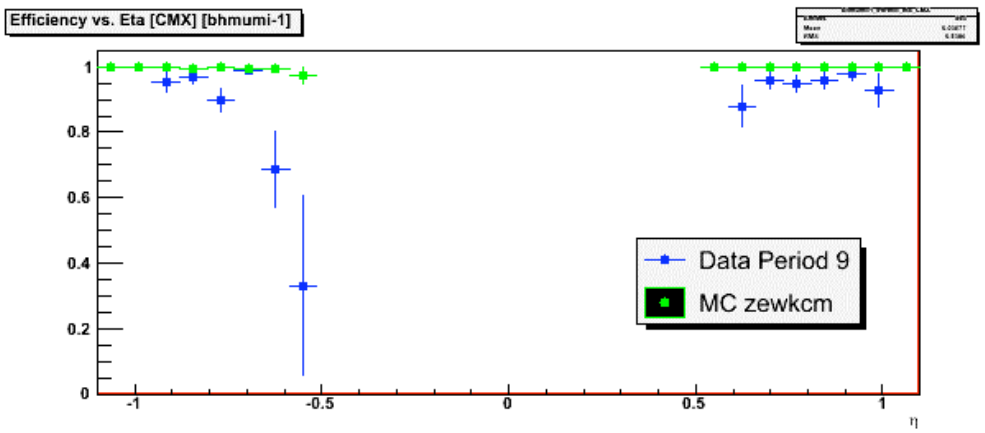
Period 8

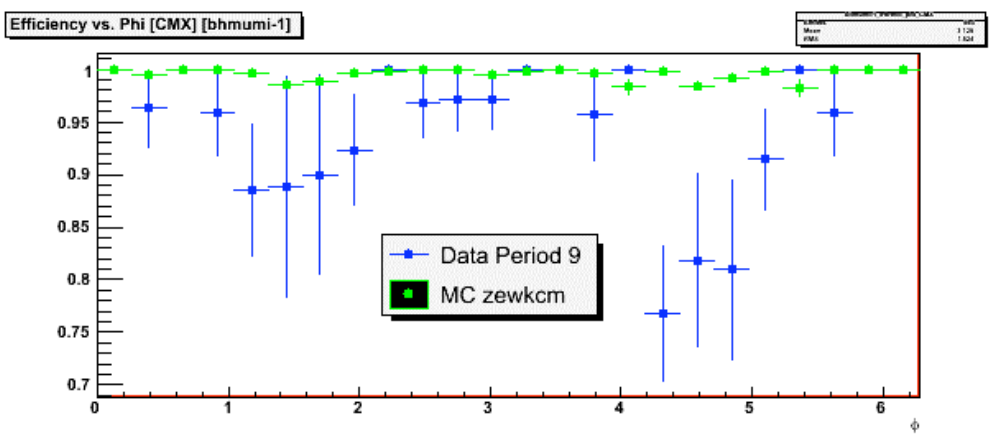




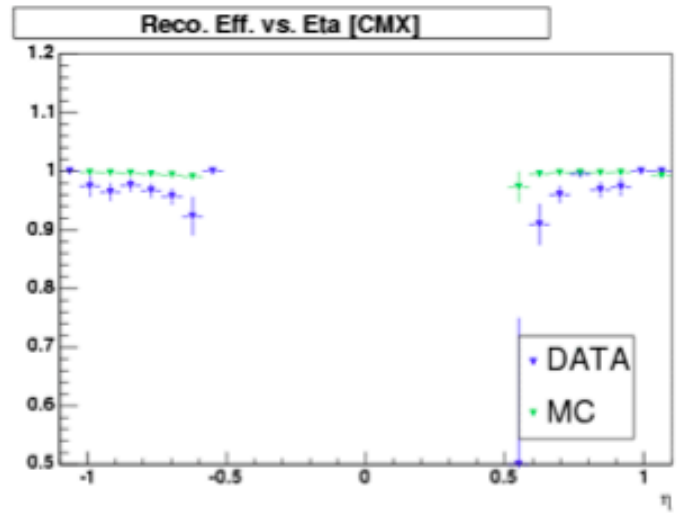
Muons: Reconstruction Eff

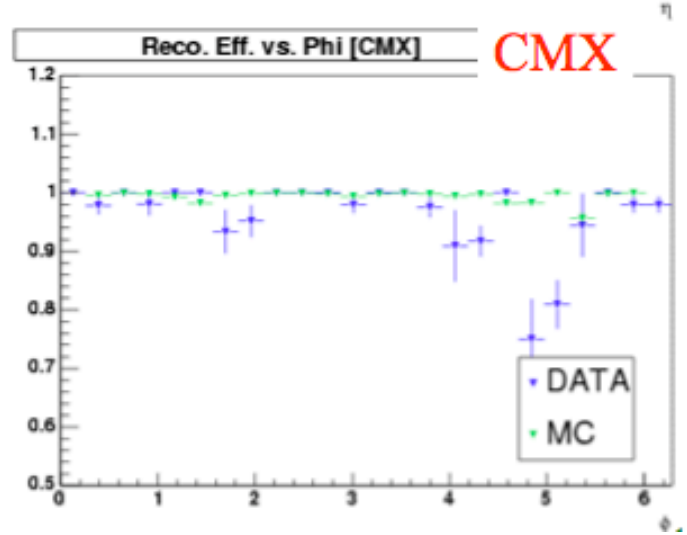
Period 9





Period 8





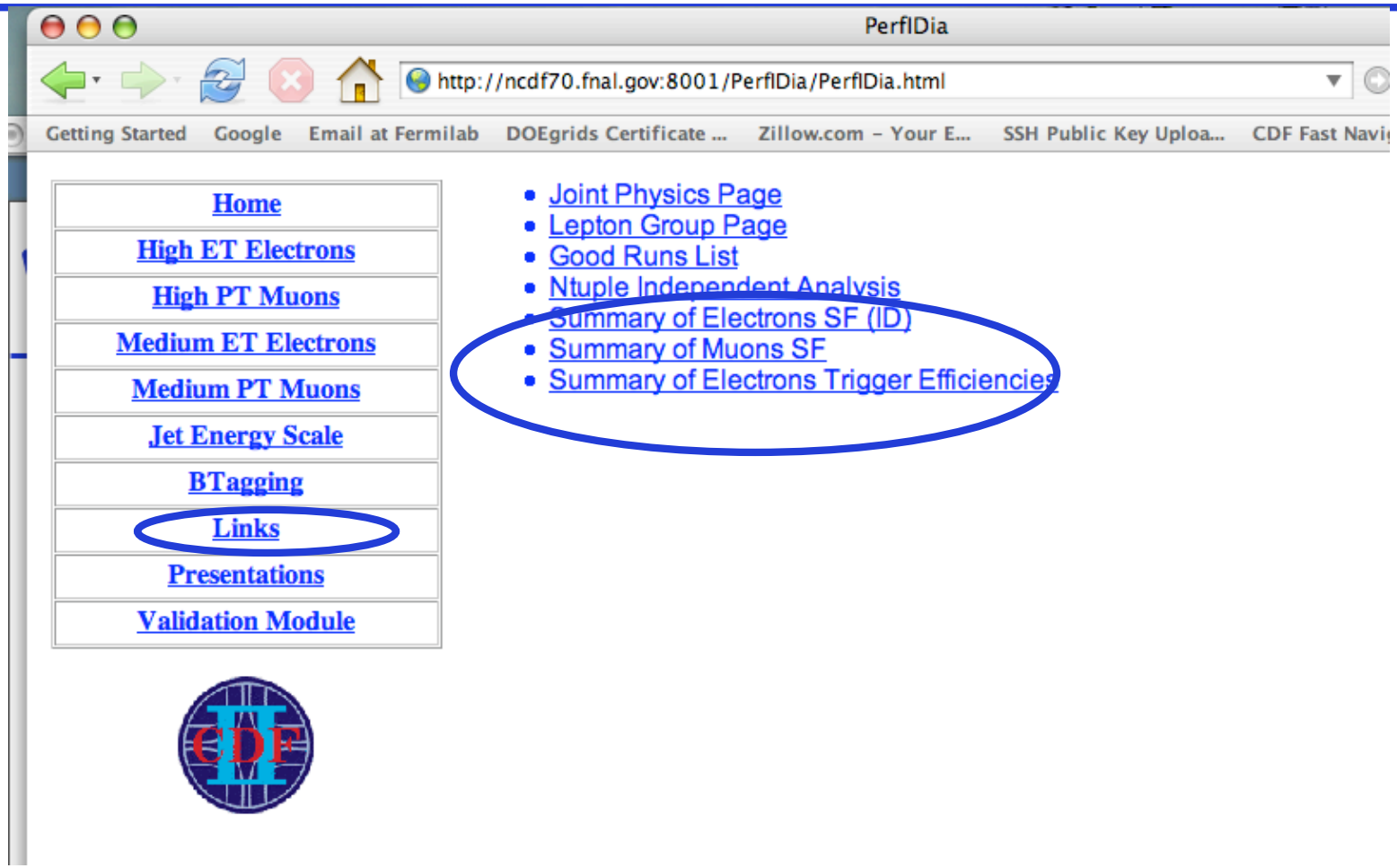
Reco/ID overall efficiency

Category	Scale Factor	
CMUP	all	0.9406 ± 0.0077
CMUP	excliso	0.9431 ± 0.0070
CMUP	sliso	0.9472 ± 0.0075
CMX	all	0.9603 ± 0.0088
CMX	excliso	0.9632 ± 0.0078
CMX	sliso	0.9600 ± 0.0087
CMX Arches	all	0.9917 ± 0.0088
CMX Arches	excliso	0.9971 ± 0.0073
CMX Arches	sliso	0.9913 ± 0.0086
CMX Miniskirt	all	0.8282 ± 0.0276
CMX Miniskirt	excliso	0.8185 ± 0.0265
CMX Miniskirt	sliso	0.8256 ± 0.0275
CMX Keystone	all	0.9160 ± 0.0527
CMX Keystone	excliso	0.9249 ± 0.0474
CMX Keystone	sliso	0.9278 ± 0.0505
CMU-only	all	0.9075 ± 0.0163
CMU-only	excliso	0.9105 ± 0.0151
CMU-only	sliso	0.9147 ± 0.0159
CMP-only	all	0.9139 ± 0.0148
CMP-only	excliso	0.9200 ± 0.0133
CMP-only	sliso	0.9236 ± 0.0143
CMX Mini/Key	all	0.8434 ± 0.0246
CMX Mini/Key	excliso	0.8370 ± 0.0235
CMX Mini/Key	sliso	0.8433 ± 0.0244

Conclusions on Muons

- We have calculated Trigger/ID/Reco Efficiencies for high Pt muons for Period 9 data
  - Major trigger changes for CMX
    - Trigger efficiency redefined and recalculated
    - L2 efficiencies being caclulated now
    - CMUP trigger changed upcoming
      - New trigger note
  - ID/Reco ok

Where to find information



Where to find information(cont'd)

PerflDia

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

Getting Started | Google | Email at Fermilab | DOEgrids Certificate ... | Zillow.com - Your E... | SSH Public Key Uploa... | CDF Fast Navigator

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

- Joint Physics Meeting, May 9 2007 : Period 9 muon blessing (still some issues with triggers)
- Joint Physics Meeting, May 2 2007 : Period 9 Muon preblessing
- Joint Physics Meeting, April 4 2007 : Period 9 electron eff blessing
- Joint Physics Meeting, March 9 2007 : Period 9 Lepton eff preblessing
- Joint Physics Meeting, Feb 23 2007 : First look at period 9 data (no MC available yet)
- Joint Physics Meeting, Dec 8 2006 : Introduction to PerflDia

Validation Module

PerflDia

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

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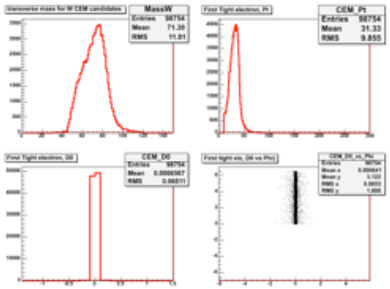
Simona Rolli's page | PerflDia

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

- Documentation:
- Code:
  - Instructions on how to run the code
- Results:
  - Period 9 data ( ): Runs 222529 to 228596 (1087 files): Electrons :



- Root file of distributions (file 1-100)
- Log file (file 1-100)
- Root file of distributions (file 101-200)
- Log file (file 101-200)
- Root file of distributions (file 201-300)
- Log file (file 201-300)
- Root file of distributions (file 301-400)
- Log file (file 301-400)
- Root file of distributions (file 401-500)
- Log file (file 401-500)
- Root file of distributions (file 501-600)
- Log file (file 501-600)
- Root file of distributions (file 601-700)
- Log file (file 601-700)
- Root file of distributions (file 701-800)
- Log file (file 701-800)

Validation Plan

Request:

- # W candidates for CEM, CMUP, CMX (add other categories if/when appropriate)
- # Z candidates electrons:C-C, C-P, muons: CMUP-X, CMUP-UP (add other categories if/when appropriate)
- mean and RMS for each of the above Z peaks
- mean <d0> and RMS-d0 for all the high-pT lepton tracks in the W sample
- <d0> vs phi... depending on stats, either use just the high-pT leptons, or all tracks >1 GeV (or so)

Status:

W candidates plots for current Period 9 ntuples and bhel0i/bhmu0i (Pre and Post SD) to compare with A. Nagano studies;

Validation Results: Electrons

(Ai Nagano,01-19-07)

Ai's analysis used Stntuple dev_243
PerfIDia uses TopNt

High pT electron sample

- bhelbd (374.53/pb) bhelbh(450.55/pb) bhelbi(276.11/pb)
- new bhelbi 191.84/pb (up to 1.2/fb)

  new bhelmi (200 pb)

- Good Run List : em_nosi version 14

New Good Run List: em_nosi version 15

CEM Event Selection

- Region = 0 (CEM), Fiducial = CES fiducial equal to 1
- Et >= 20 GeV, MET>=25 GeV
- |Track Z0| =< 60 cm
- Track Pt >= 10 GeV/c
- COT
  - 3 Axial SLs with 5 hits / SL
  - 2 Stereo SLs with 5 hits / SL
- Conversion - not equal to 1
- Iso(R=0.4)/Et =< 0.1
- E_Had / E_EM (3 tower) =< 0.055 + (0.00045 * E)
- Lshr (3 tower, track) =< 0.2
- E/p =< 2 unless track Pt >= 50 GeV/c
- |CES delta-Z| < 3 cm, Signed CES delta-X: -3.0 =< Q * delta-X =< 1.5 cm
- CES Strip chi-2 =< 10
- 30 < Masst < 120

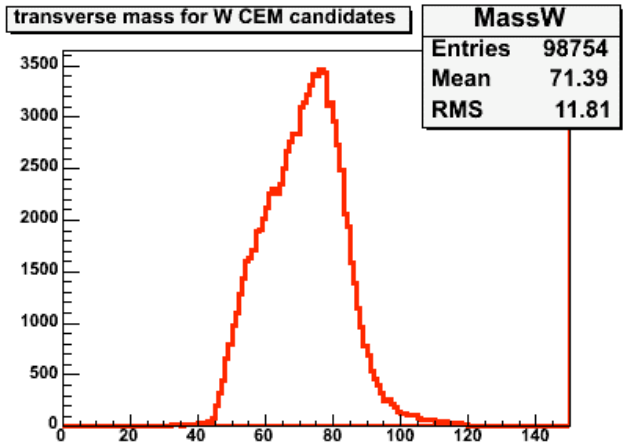
Validation Results: Electrons

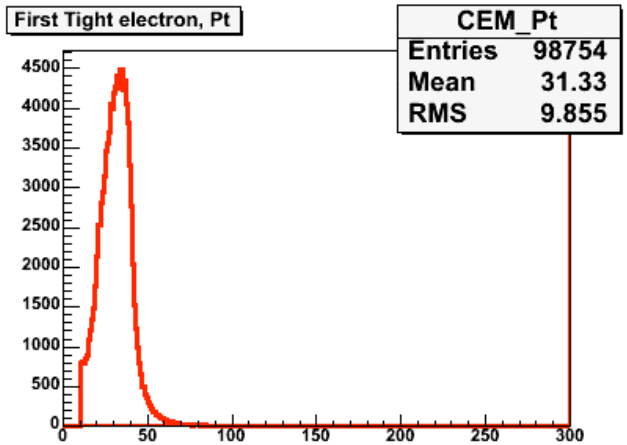
	CEM			
	0d	0h	0i	0i new
Number of Data	209600	254595	152748	104357
QCD BG	1893±83 (0.903 %)	2392±90 (0.940 %)	1966±88 (1.287 %)	1214±60 (1.164 %)
$W \to \tau\nu$	5273±24 (2.516 %)	6371±42 (2.503 %)	3826±34 (2.505 %)	2662±24 (2.551 %)
$Z \to \mu\mu$	2271±11 (1.084 %)	2814±12 (1.105 %)	1718±11 (1.125 %)	1195±7 (1.146 %)
$\mathscr{A}$	0.203	0.205	0.204	0.204
ε_{all}	0.958	0.960	0.949	0.949
$\int \mathscr{L} dt$	374.53±22.47	450.55±27.03	275.72±16.54	191.84±11.51
$\sigma(W \to e\nu)$/nb	2.754	2.745	2.726	2.678
$\delta(\sigma)$/nb (stat.)	0.006	0.005	0.007	0.008
$\delta(\sigma)$/nb (lumi.)	0.165	0.165	0.164	0.161

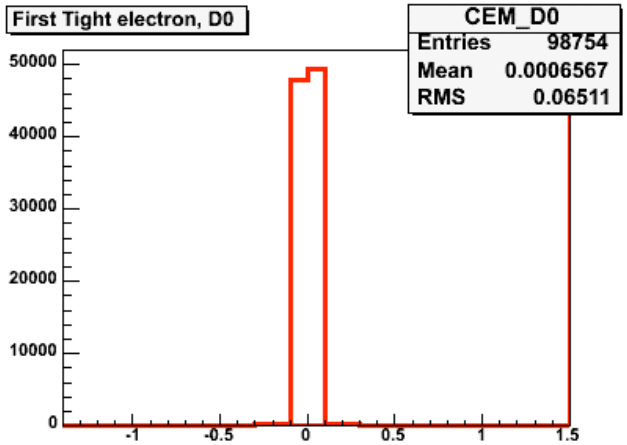
CEM			
	bhel0i (P8)	bhel0i new (Period 8)	Bhelmi (Period9)
Number of data	152115	101043	98754

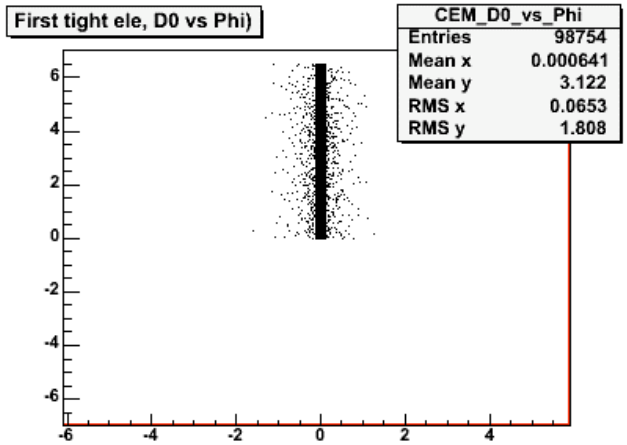
Validation Results: Electrons

CEM W candidates









Validation: Muons

High pT muon sample

- bhmubd (361.8/pb) bhmubh(399.48/pb) bhmubi(269.70/pb)
- new bhmubi 176.66/pb (up to 1.2/fb)
  new bhmumi
- Good Run List : em_mu_nosi_cmxignored version 14
  GRL em_mu_nosi_cmxignored V15

- Missing Et : MET > 20 GeV
- Transverse Mass(mu, nu) : 30 < Masst < 120
- Cosmic Veto
- Z -> mu mu Veto recommended by Eric
  - no other track which has
  - pT > 10 GeV
  - N COT AX hit >=3, N COT ST hit>=2
  - |d0|<0.5cm, |Z0|<60cm
  - Iso<0.1

!= isZ

Muon Event Selection

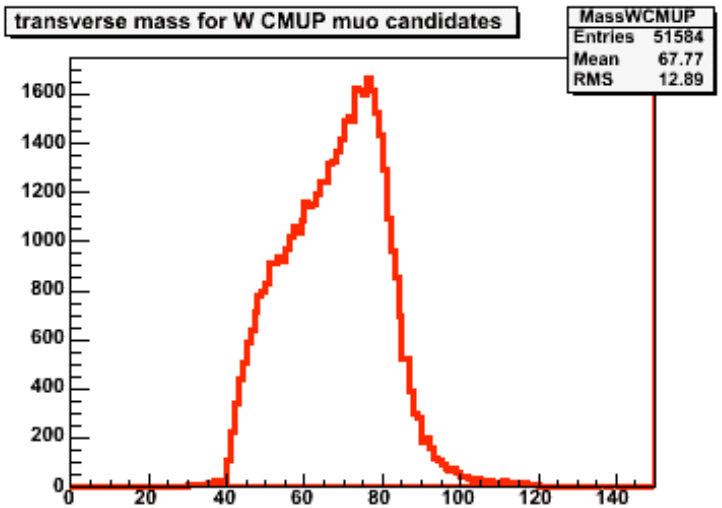
- pT > 20 GeV/c
- EM Energy < 2 GeV + max(0,0.0115*(p-100))
- Had Energy < 6 GeV + max(0,0.028*(p-100))
- Isolation (R=0.4) = (total Et in R=0.4 around muon) / Pt < 0.1
- COT 3 Axial SLs with 5 hits / SL, 2 Stereo SLs with 5 hits / SL
- |Track Z0| =< 60 cm
- Tracks w/o si: |D0| < 0.2 cm, with si : |D0| < 0.02 cm
- if CMUP muons, |delta-X (CMU)| < 3 cm and |delta-X (CMP)| < 5 cm
- if CMX muons, run > 150144, |delta-X (CMX)| < 6 cm,
- and rho(COT) > 140 cm
- For CMUP muons: x-fid(CMP) < 0 cm, z-fid(CMP) < -3 cm
- For CMX muons: x-fid(CMX) < 0 cm, z-fid(CMX) < -3 cm
- chi2 < 2.75 (0d) < 2.3(0h,0i) (only for data)

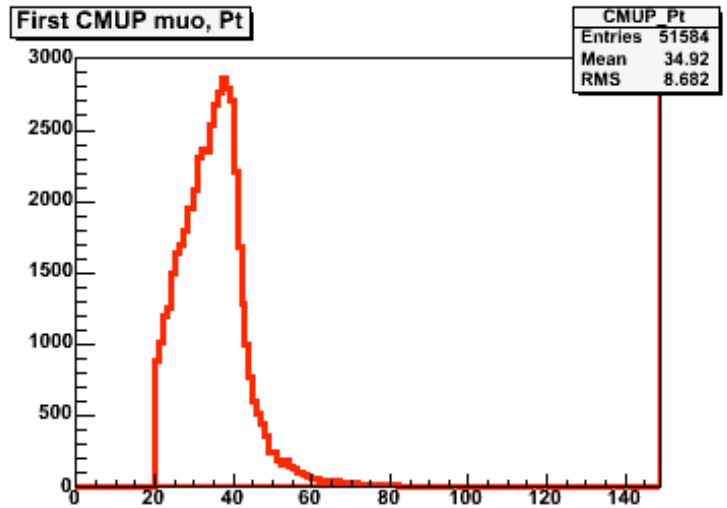
Muons: CMUP Results

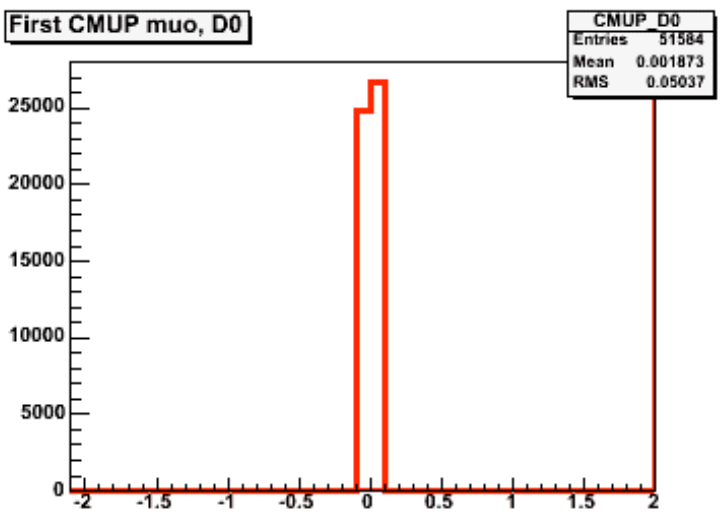
	CMUP			
	0d	0h	0i	0i new
Number of Data	118006	133117	88319	59170
QCD BG	994±34 (0.843 %)	1123±36 (0.844 %)	709±27 (0.804 %)	513±23 (0.868 %)
$W \to \tau\nu$	3508±18 (2.973 %)	3925±31 (2.949 %)	2605±26 (2.950 %)	1719±17 (2.906 %)
$Z \to \mu\mu$	9258±21 (7.846 %)	10465±22 (7.862 %)	6938±18 (7.856 %)	4579±11 (7.739 %)
$\mathscr{A}$	0.130	0.129	0.129	0.129
ε_{all}	0.796	0.821	0.809	0.814
$\int \mathscr{L} dt$	361.76±21.71	399.48±23.97	269.70±16.18	176.85±10.61
$\sigma(W \to \mu\nu)$/nb	2.781	2.772	2.771	2.816
$\delta(\sigma)$/nb (stat.)	0.008	0.008	0.009	0.012
$\delta(\sigma)$/nb (lumi.)	0.167	0.166	0.166	0.169

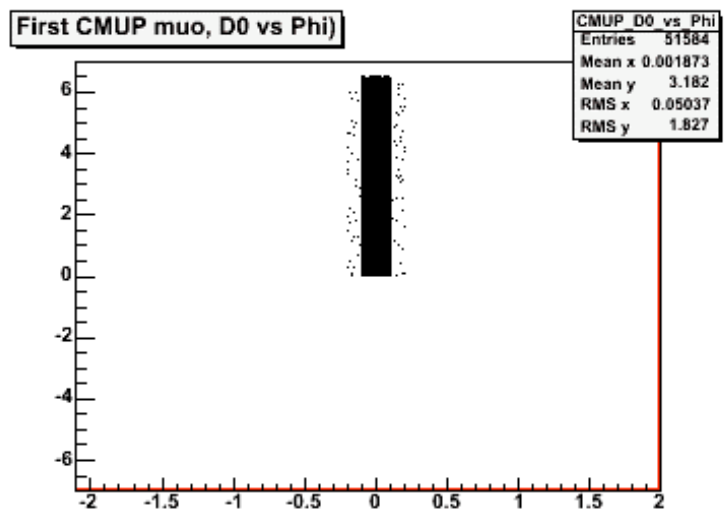
CMUP			
	bhmu0i	bhmu0i new	bhmumi
Number of data	83091	53995	51584

CMUP Plots


transverse mass for W CMUP muo candidates
MassWCMUP
Entries 51584
Mean 67.77
RMS 12.89


First CMUP muo, Pt
CMUP_Pt
Entries 51584
Mean 34.92
RMS 8.682


First CMUP muo, D0
CMUP_D0
Entries 51584
Mean 0.001873
RMS 0.05037

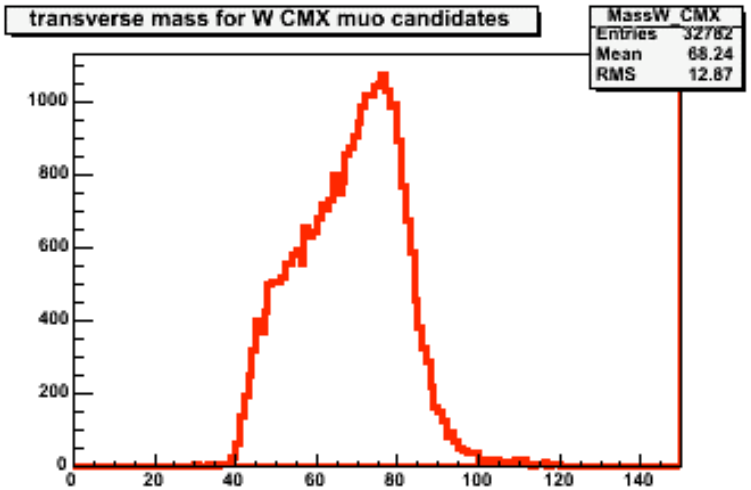

First CMUP muo, D0 vs Phi)
CMUP_D0_vs_Phi
Entries 51584
Mean x 0.001873
Mean y 3.182
RMS x 0.05037
RMS y 1.827

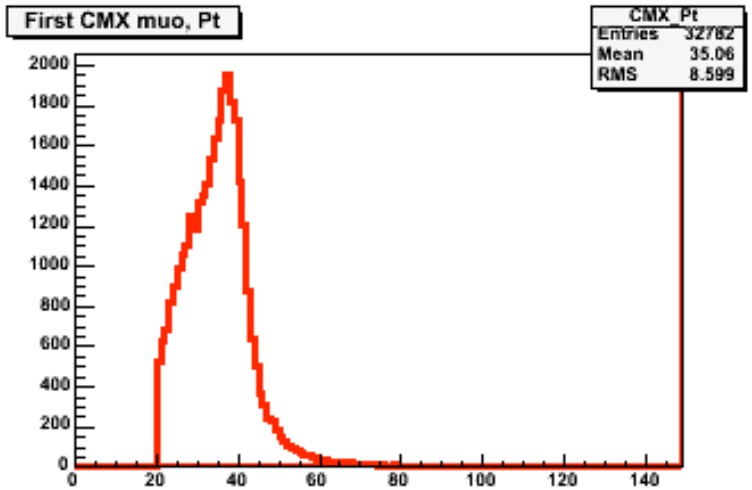
Muons: CMX Results

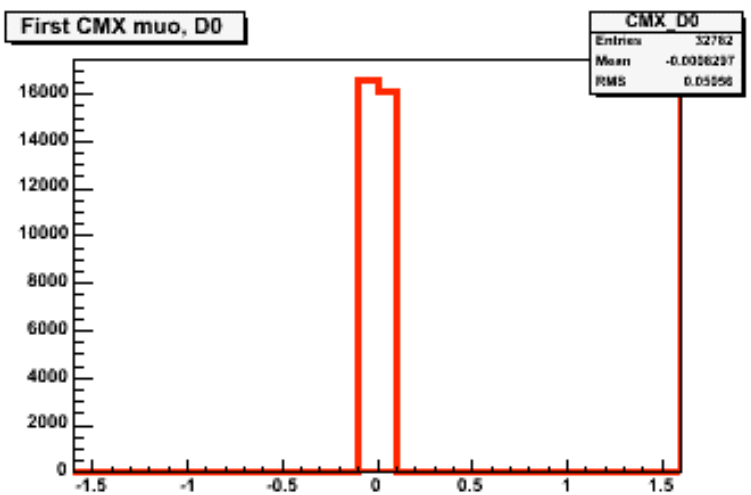
	CMX			
	0d	0h	0i	0i new
Number of Data	62067	69186	46570	31334
QCD BG	560±25 (0.903 %)	666±27 (0.964 %)	487±23 (1.047 %)	315±18 (1.007 %)
$W \to \tau\nu$	1908±14 (3.075 %)	1974±23 (2.854 %)	1384±20 (2.974 %)	896±13 (2.861 %)
$Z \to \mu\mu$	4652±16 (7.496 %)	5211±16 (7.532 %)	3558±13 (7.642 %)	2303±8 (7.352 %)
$\mathscr{A}$	0.062	0.060	0.061	0.061
ε_{all}	0.927	0.905	0.914	0.902
$\int \mathscr{L} dt$	341.70±20.50	399.48±23.97	269.70±16.18	176.88±10.61
$\sigma(W \to \mu\nu)$/nb	2.780	2.811	2.751	2.874
$\delta(\sigma)$/nb (stat.)	0.011	0.011	0.013	0.016
$\delta(\sigma)$/nb (lumi.)	0.167	0.169	0.165	0.172

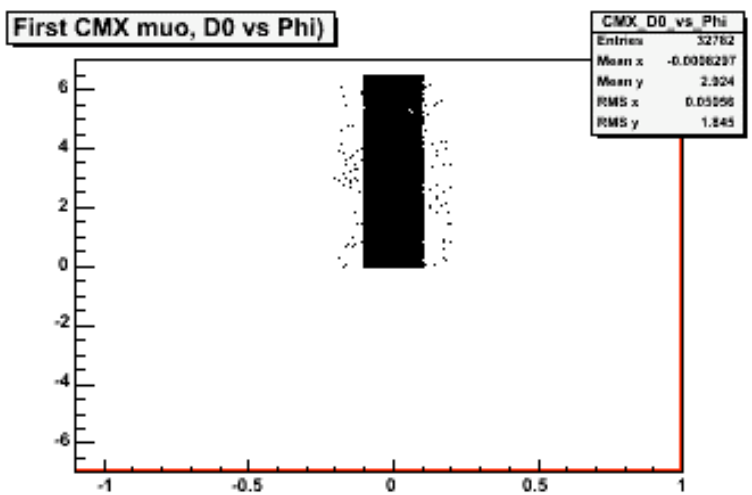
CMX			
	bhmu0i	bhmu0i new	bhmumi
Number of data	54548	34917	32782

CMX Plots


transverse mass for W CMX muo candidates
MassW_CMX
Entries 32782
Mean 68.24
RMS 12.87


First CMX muo, Pt
CMX_Pt
Entries 32782
Mean 35.06
RMS 8.599

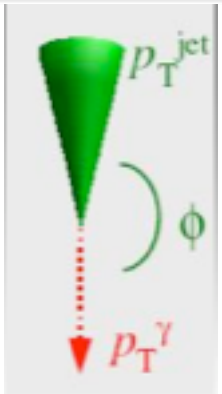

First CMX muo, D0
CMX_D0
Entries 32782
Mean -0.0036297
RMS 0.05556


First CMX muo, D0 vs Phi)
CMX_D0_vs_Phi
Entries 32782
Mean x -0.0036297
Mean y 2.324
RMS x 0.05556
RMS y 1.845

Jet Energy Scale

Our basic strategy for validating jet energy scale relies on:

- Photon-jet Pt balance
  - Photon energy well calibrated
  - Good check of the "absolute" energy scale



Selections

(CDF note 7451)

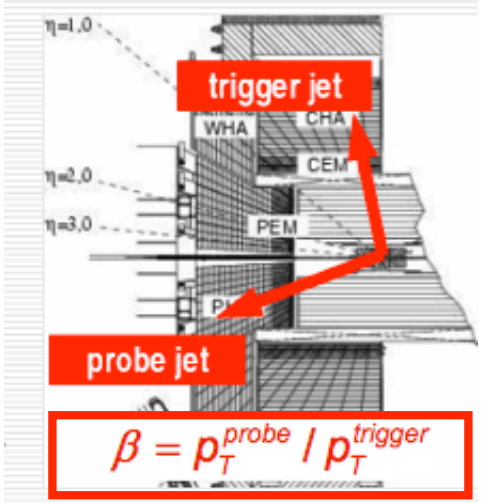
- *Pho_25_tight trigger*
- *Photon with $P_{T\gamma}$> 27 GeV, 0.2<|η|<0.6*
- *One vertex (Qual. 12)*
- *Δφ(γ-jet)> 3*
- *2nd jet P_T< 3 GeV*

P_T Balance: variable of interest

$$f_b \equiv \frac{P_T^{jet}}{P_T^{\gamma}} - 1$$

- Di-jet Pt balance
  - Large statistics in jet samples
  - Good check/calibration of the "relative" energy scale

K.Hatakeyama
M. D'Onofrio
N.van Remortel



Event Selections (CDFnote 7354, 8030)

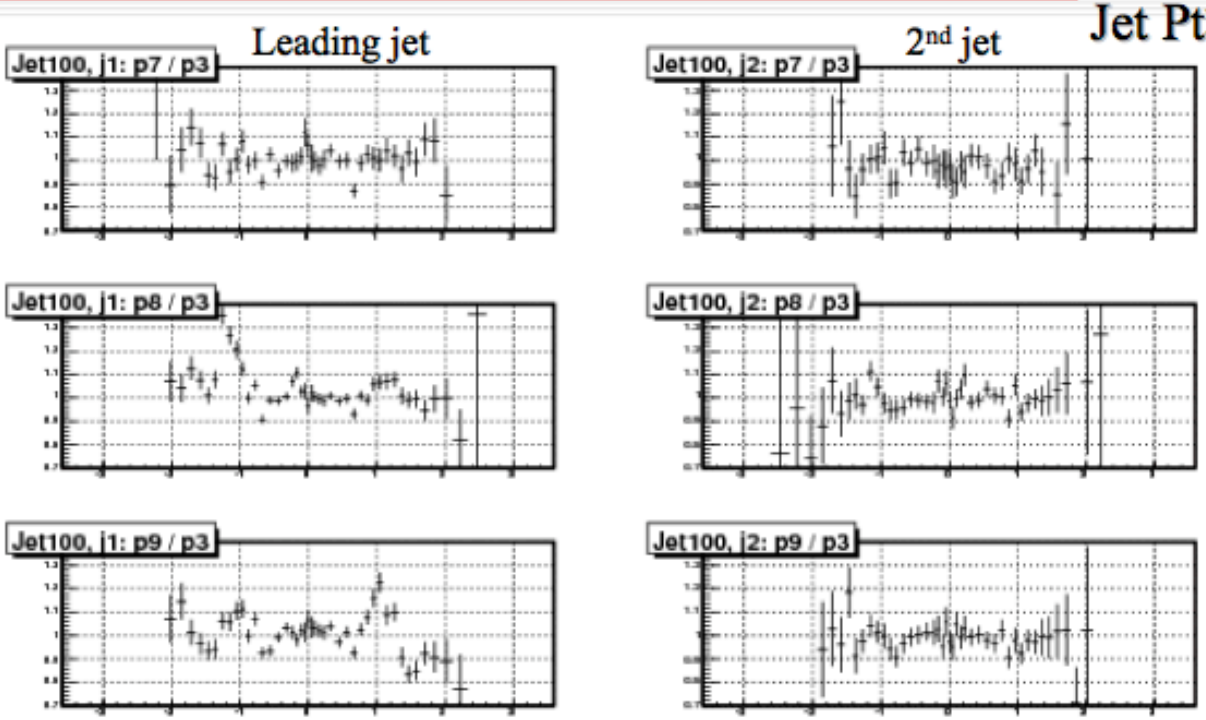
- MET significance cut
- Δφ(γ-jet) >3 (rad)
- 0.2 < $|\eta_{jet1\ or\ 2}|$ < 0.6
- Pt_{jet3} < 8 or 10 GeV/c
- |Zvtx| < 60 cm

DQM good run list version 15 is used.

JES: Dijets Period 9

Jet rate vs detector-eta: jet100

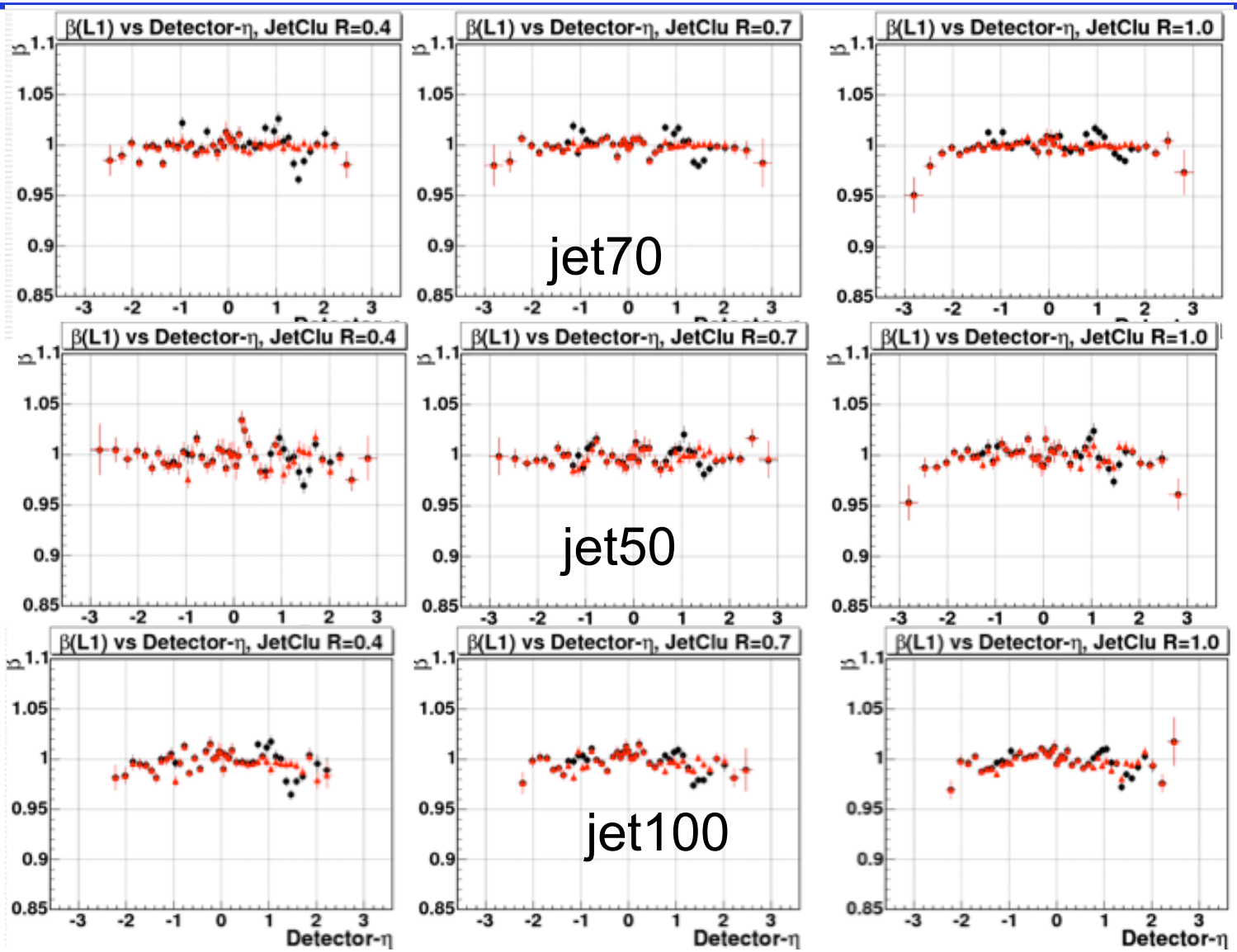
Jet Pt>125 GeV/c



- Period 9 plots show that jet rate is higher in WHA region and lower in the east plug which is consistent with dijet balance results. Make a patch to jet correction to account for it.
- Period 8 shows the contribution from hot tower d-eta=[-1.32:-1.2] & phi=[-90:-75deg]

JES:Dijets Period 9

$$\beta = p_T^{probe} / p_T^{trigger}$$



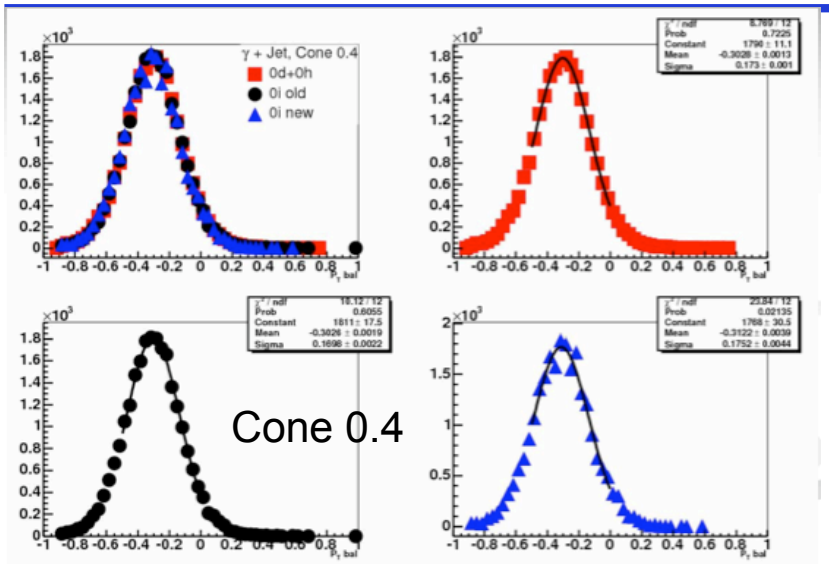
JES:Dijets Conclusions

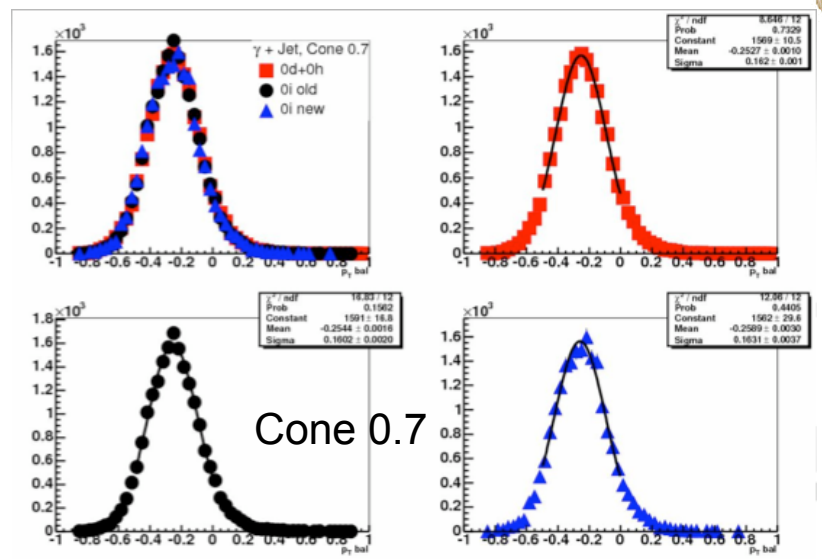
- The dijet balance and jet rate plots for period 9 indicate that:
  - JES in the WHA region is high (~1-2%)
  - JES in the east plug low (~2-3%)

  Note: the east plug gain drop seems to be getting worse gradually. Something to be checked quickly in period 10!
- Updating the relative jet correction for period 9.
  - Taken from jet70. No Pt dependence. Making sure that it works for other jet dataset dijet balance and jet rate plots.

- There is indication that the jet response in WHA region is low by a few percents. in Period 10
  - Indicated both in dijet balance and jet yields

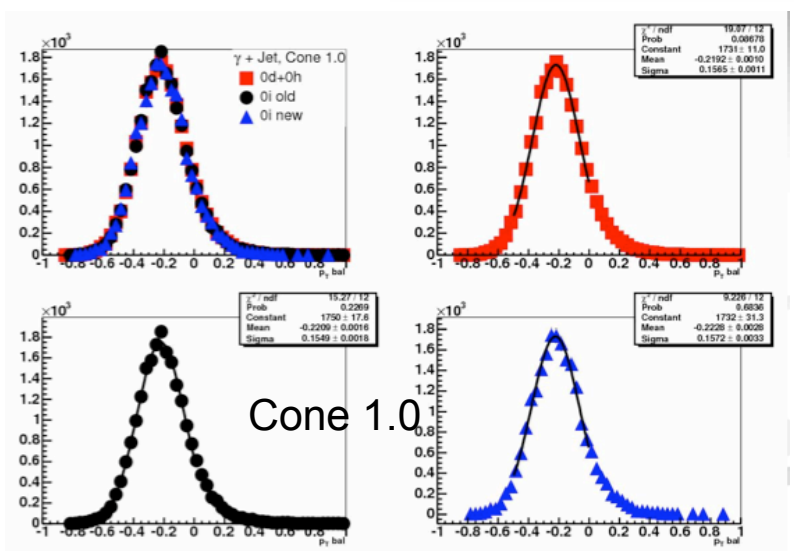
JES: Photon + Jet Period 9





P_T Balance: variable of interest

$$f_b \equiv \frac{P_T^{jet}}{P_T^{\gamma}} - 1$$



JES: Photon + Jet Period 10 first Look

- Cone 0.4 balance has shifted with ~2sigma since period 9 (keep on monitoring this)
- Propose to wait still and see when we merge period 9-11

Fit results for balance distributions

All rapidities up to $|\eta| < 3.0$

	Cone 0.4	Cone 0.7	Cone 1.0
	0h+0d		
mean	-0.303 ± 0.001	-0.253 ± 0.001	-0.219 ± 0.001
sigma	0.173 ± 0.001	0.162 ± 0.001	0.157 ± 0.001
	0i period 5-8		
mean	-0.303 ± 0.002	-0.254 ± 0.002	-0.221 ± 0.002
sigma	0.170 ± 0.002	0.160 ± 0.002	0.155 ± 0.002
	0i period 9		
mean	-0.312 ± 0.004	-0.259 ± 0.003	-0.223 ± 0.003
sigma	0.17 ± 0.004	0.163 ± 0.004	0.157 ± 0.003
	0i period 10		
mean	-0.310 ± 0.003	-0.256 ± 0.002	-0.220 ± 0.002
sigma	0.174 ± 0.003	0.166 ± 0.003	0.163 ± 0.002

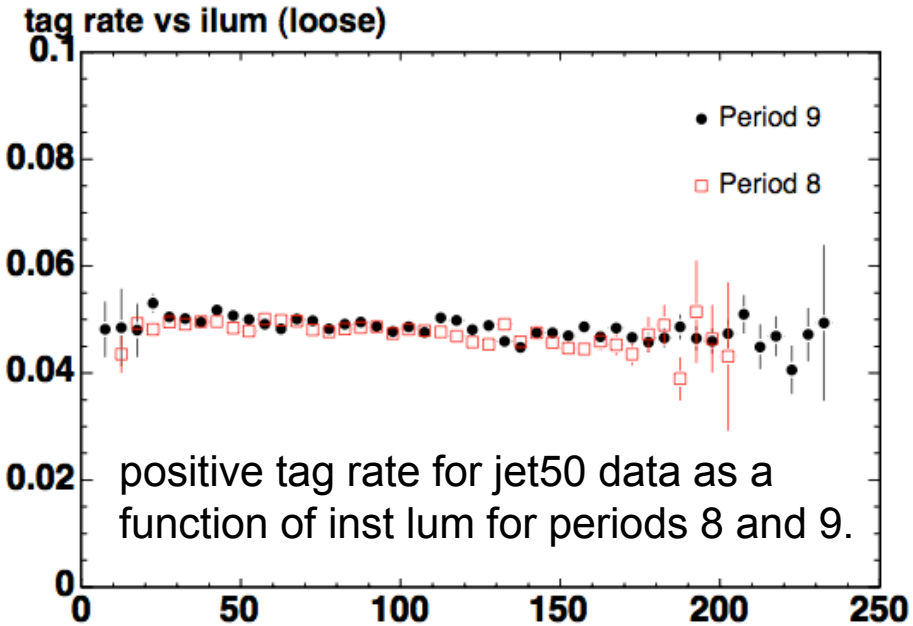
Fit results for balance distributions

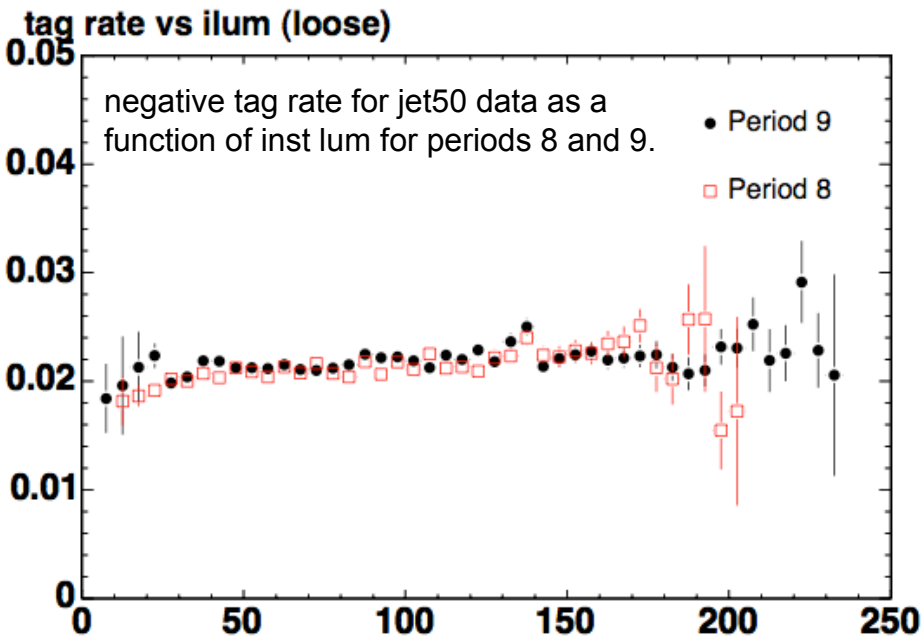
Central rapidity $|\eta| < 0.6$

	Cone 0.4	Cone 0.7	Cone 1.0
	0h+0d		
mean	-0.281 ± 0.002	-0.246 ± 0.002	-0.221 ± 0.002
sigma	0.160 ± 0.002	0.152 ± 0.002	0.146 ± 0.002
	0i period 5-8		
mean	-0.281 ± 0.003	-0.243 ± 0.003	-0.216 ± 0.003
sigma	0.150 ± 0.003	0.145 ± 0.003	0.145 ± 0.003
	0i period 9		
mean	-0.296 ± 0.006	-0.254 ± 0.005	-0.233 ± 0.005
sigma	0.160 ± 0.007	0.149 ± 0.006	0.146 ± 0.005
	0i period 10		
mean	-0.290 ± 0.004	-0.248 ± 0.004	-0.227 ± 0.004
sigma	0.166 ± 0.005	0.155 ± 0.004	0.153 ± 0.004

Btagging

Not In PerfIDia yet



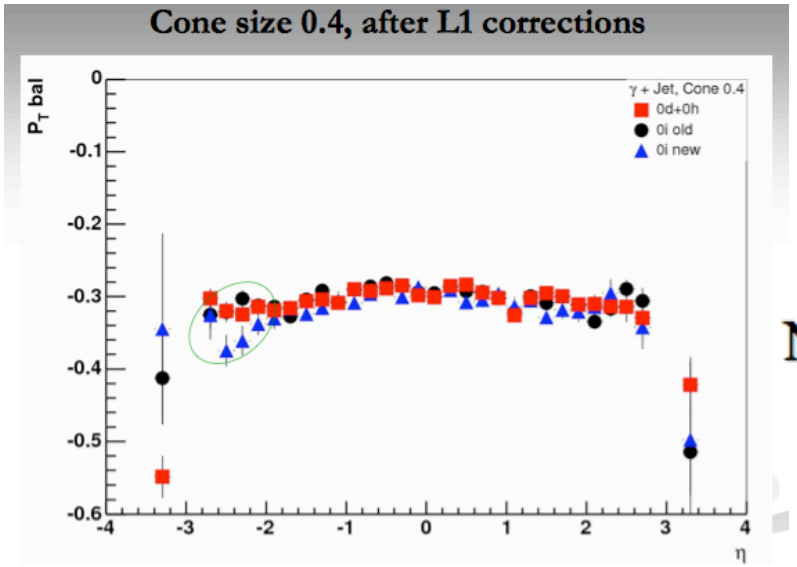


There is a separate talk on b-tagging (S. DeCecco, Thursday morning)

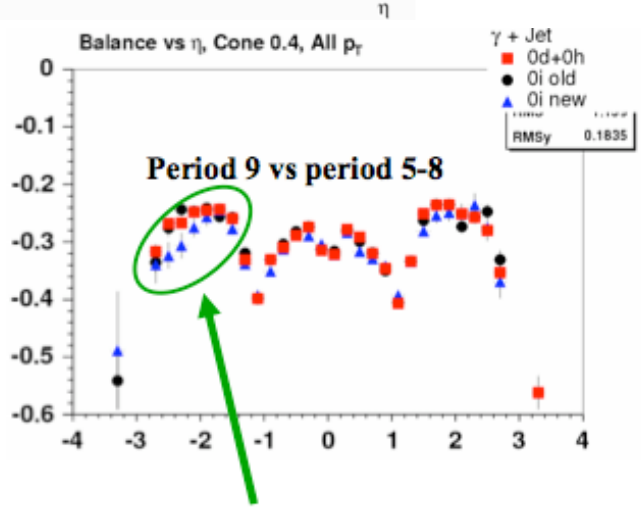
Conclusions

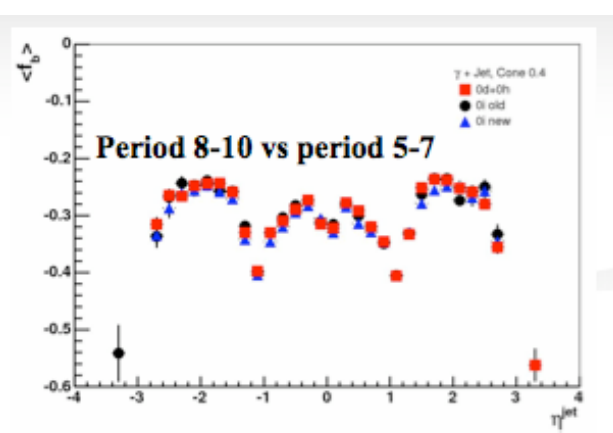
- PerfIDia well underway for lepton efficiencies
  - Muon trigger issues
- Core team:
  - S. R.
  - Daryl Hare, Lubos Lovas and Bo-Young Han (thanks!)
  - Code under control, can be ran quickly when ntuple ready
- Plan to finalize the validation module
  - Check for discrepancies with STNtuple
- Plan to add Jet scale and btagging in the same way as for leptons (end of Summer?)

JES: Photon + Jet Period 9



No significant change in the absolute jet energy





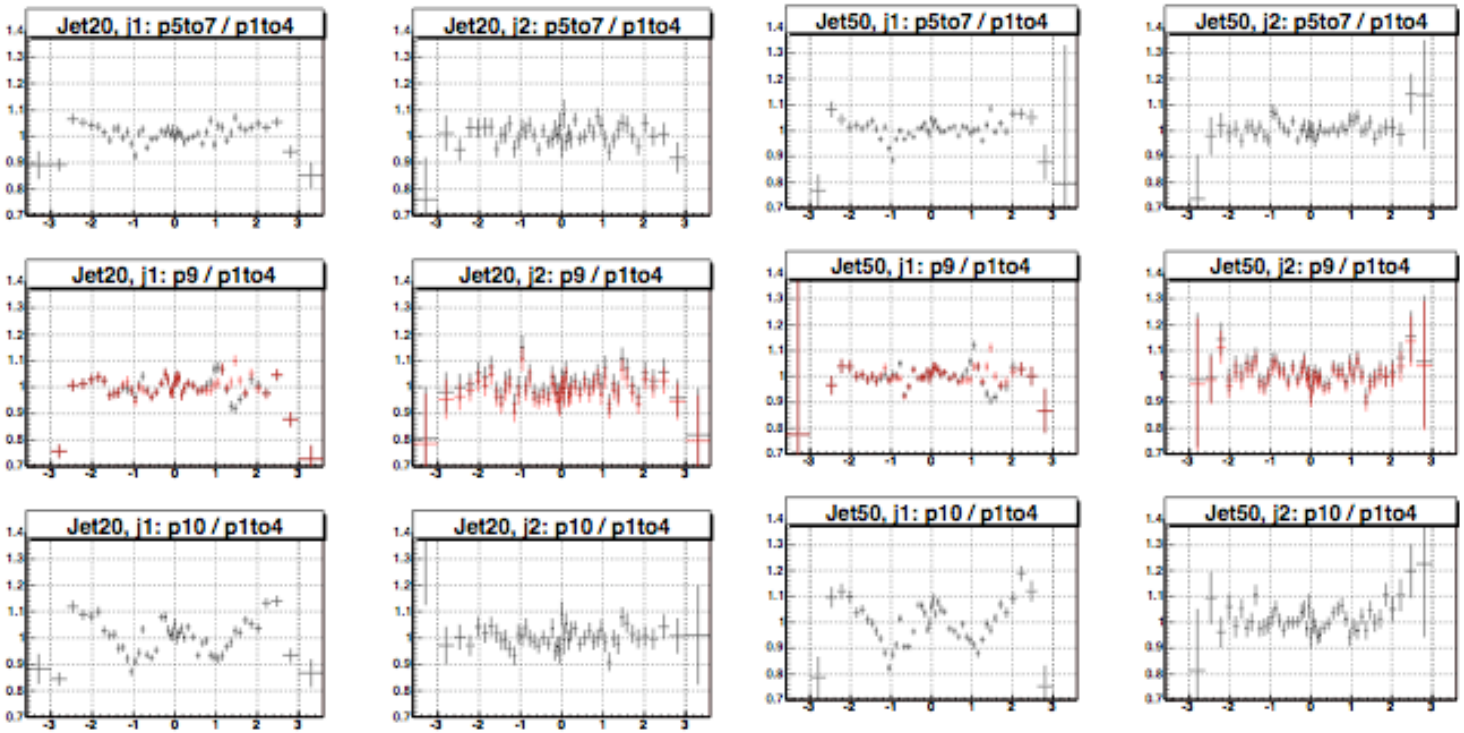
Small discrepancy (1.5 sigma) in forward region dissapeared with more statistics

JES: Dijets Period 10

Jet rate vs detector-eta: jet20/50

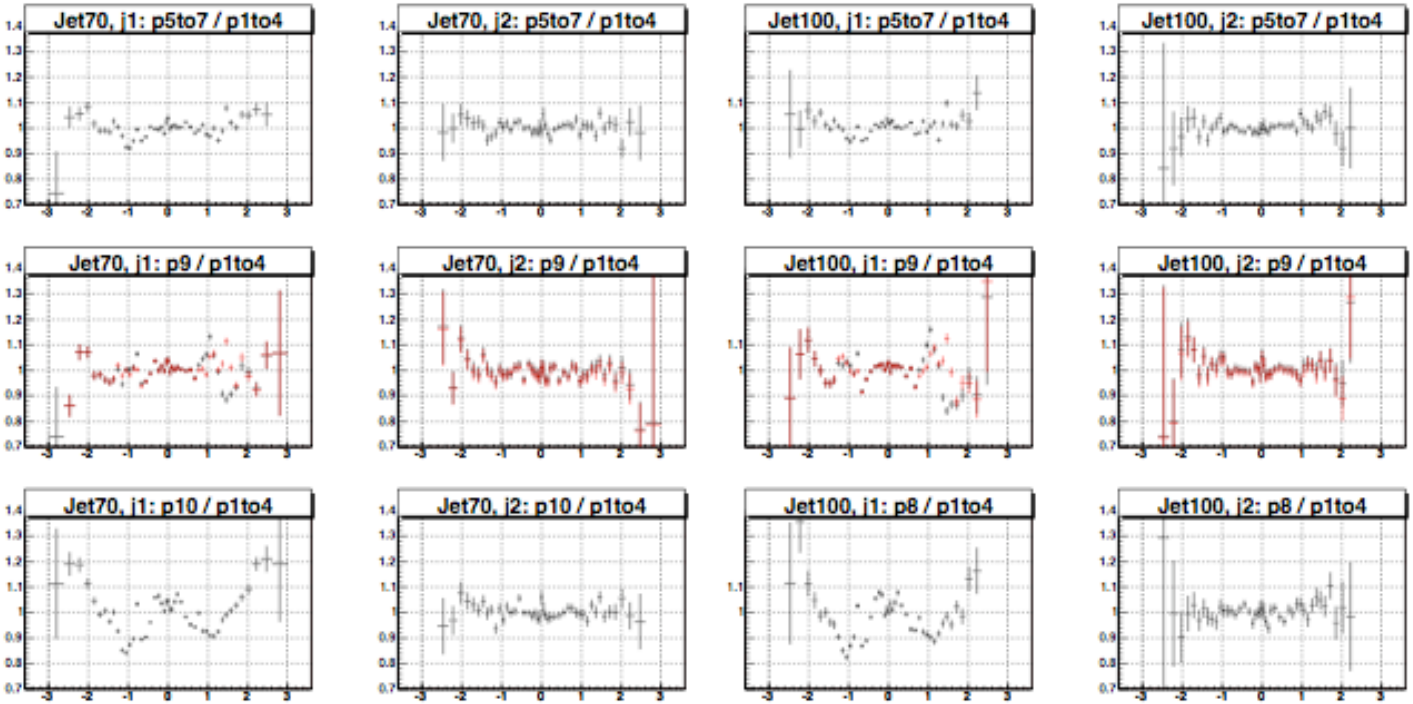
R=0.4 jets, no Nvtx cut.
Jet20: Jet Pt > 35 GeV/c
Jet50: Jet Pt > 65 GeV/c

0h period used as a reference.
Black: without patch
Red: with patch



JES: Dijet Period 10

Jet rate vs detector-eta: jet70/100

R=0.4 jets, no Nvtx cut.
Jet70: Jet Pt > 85 GeV/c
Jet100: Jet Pt > 125 GeV/c

0h period used as a reference.
Black: without patch
Red: with patch