



JetMET POG DQM

**Frank Chlebana, Ken Hatakeyama,
Jared Sturdy, Anwar Bhatti,
Greg Landsberg, Filip Moortgat**

**DQM WorkShop
Sept 4 2008**



People



Ken Hatakeyama and Jared Sturdy have joined

**Have had several discussions with MET
conveners, Greg Landsberg and Filip Moortgat
on what we would like to monitor**

Presentations made in JetMET and MET meetings

***Summary of what we want to do kept in a working
document...***



Requirements



Need to provide quality information at the detector segmentation

Barrel, EndCap, Forward

We need to be able to determine data quality *per luminosity section* in order to be able to exclude bad data within a run

Will monitor basic Jet and MET distributions

Will rely mainly on the DPG monitoring but will use POG monitoring as a cross check



Functional Description



First we define the data quality flags that we will want to save in DBS

Layer 1
JetMET_Global

Layer 2
JetMET_Jet

Layer 3
JetMET_Jet_Barrel
JetMET_Jet_EndCap
JetMET_Jet_Forward
JetMET_Jet_J20
JetMET_Jet_J110

JetMET_MET

JetMET_MET_All
JetMET_MET_NoHF

Need to specify granularity at the detector level
Barrel, EndCap, Forward

Monitor Low (J20) and High (J110) pT triggers



Functional Description



```
JetMET_Jet

if ( (JetMET_Jet_Barrel == 1) &&
      (JetMET_Jet_EndCap == 1) &&
      (JetMET_Jet_Forward == 1) ) JetMET_Jet = 1

JetMET_Jet_XXX

Quality flag for jets in the XXX (Barrel, EndCap, Forward) region

if ( (JetMET_Jet_XXX_Pt_Low_Val > 950) &&
      (JetMET_Jet_XXX_Pt_High_Val > 950) &&
      (JetMET_Jet_XXX_Eta_Low_Val > 950) &&
      (JetMET_Jet_XXX_Eta_High_Val > 950) &&
      (JetMET_Jet_XXX_Phi_Low_Val > 950) &&
      (JetMET_Jet_XXX_Phi_High_Val > 950) &&
      (JetMET_Jet_XXX_Constituents_Low_Val > 950) &&
      (JetMET_Jet_XXX_Constituents_High_Val > 950) &&
      (JetMET_Jet_XXX_HOverE_Low_Val > 950) &&
      (JetMET_Jet_XXX_HOverE_High_Val > 950) ) JetMET_Jet_Barrel = 1

JetMET_Jet_XXX_Pt_YYY_Val
Result of KS test between current data and reference distributions for the Barrel, EndCap, and Forward region.

JetMET_Jet_XXX_Eta_YYY_Val
Result of KS test between current data and reference distributions for the Barrel, EndCap, and Forward region.

JetMET_Jet_XXX_Phi_YYY_Val
Result of KS test between current data and reference distributions for the Barrel, EndCap, and Forward region.

JetMET_Jet_XXX_Constituents_YYY_Val
Result of KS test between current data and reference distributions for the Barrel, EndCap, and Forward region.

JetMET_Jet_XXX_HOverE_YYY_Val
Result of KS test between current data and reference distributions for the Barrel, EndCap, and Forward region.

JetMET_Jet_J20
Monitor the performance of the J20 trigger path. Result of KS test between current data and reference
distributions.

if ( (JetMET_Jet_J20_Pt_Val > 950) &&
      (JetMET_Jet_J20_Eta_Val > 950) ) JetMET_Jet_J20 = 1

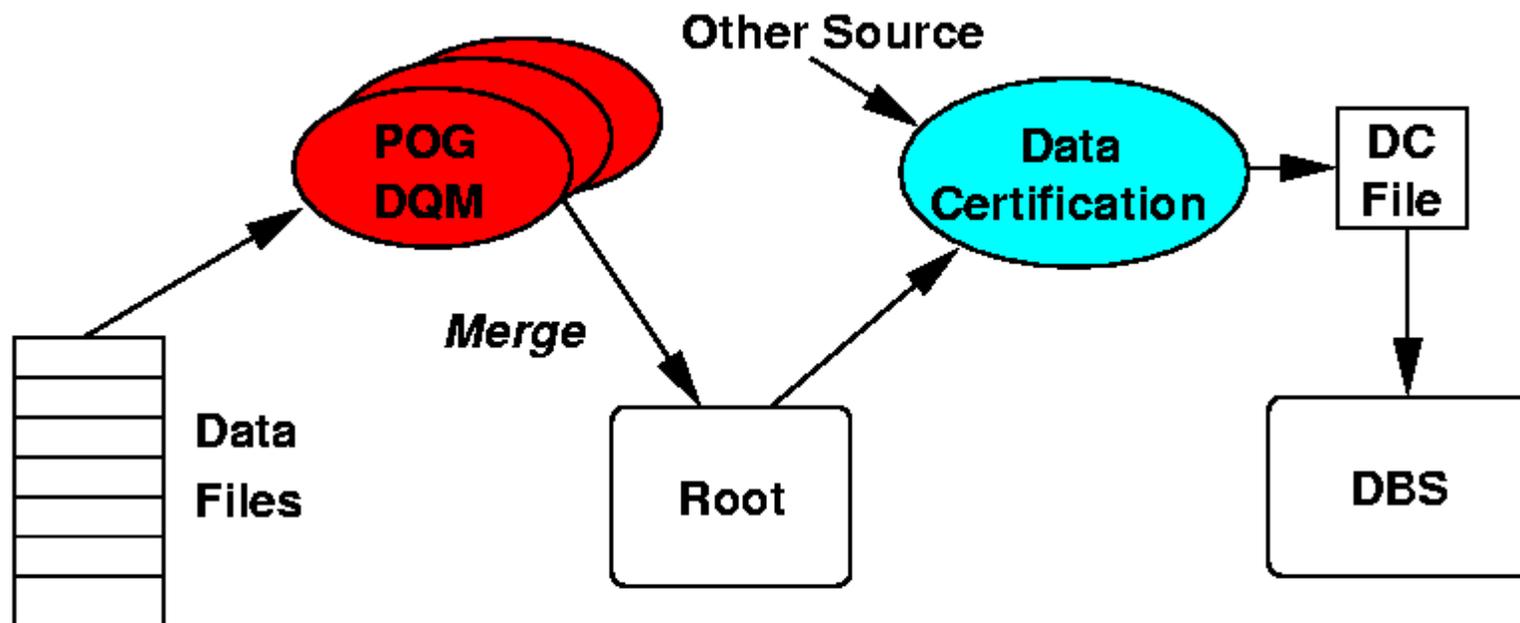
JetMET_Jet_J20_Pt_Val
The KS score when comparing the Pt distribution of the current data with the reference distribution.
```

Specify how the quality flags are determined

Have a “working document” with details

We update web page as our plan develops

Will move to a more official URL



POG Monitoring runs in parallel → *results merged*

Data Certification runs on the merged root file

All algorithm changes contained in one place

Writes results to a “Data Certification” file



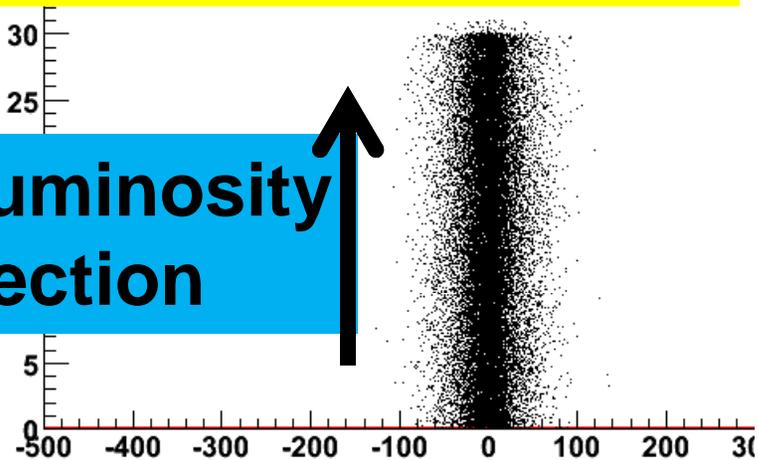
Determining Data Quality in a LS



METTask_CaloMEyNoHF_LS

Filled in POG Monitor

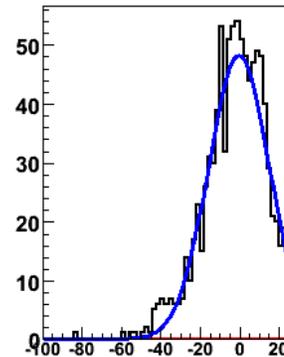
Luminosity Section



Fill a 2d histogram

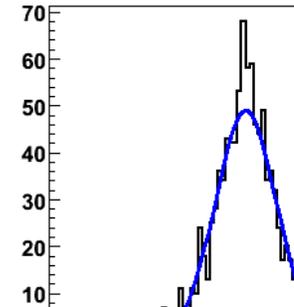
Take projection and fit to get mean and chi2

METTask_CaloMEx_LS



Entries	1000
Mean	-0.686
RMS	17.06
χ^2 / ndf	62.17 / 50
Prob	0.1158
Constant	48.35 ± 2.18
Mean	-0.3872 ± 0.5200
Sigma	15.52 ± 0.49

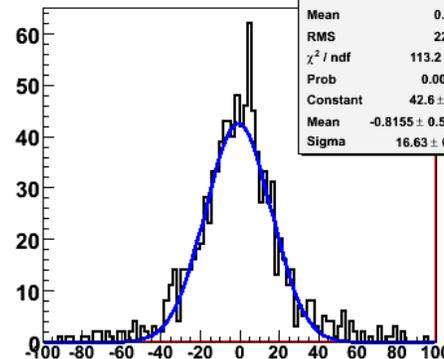
METTask_CaloMEy_LS



Entries	1000
Mean	-0.728
RMS	16.68
χ^2 / ndf	53.52 / 51
Prob	0.3778
Constant	49.08 ± 2.22
Mean	-0.01653 ± 0.51130
Sigma	15.41 ± 0.49

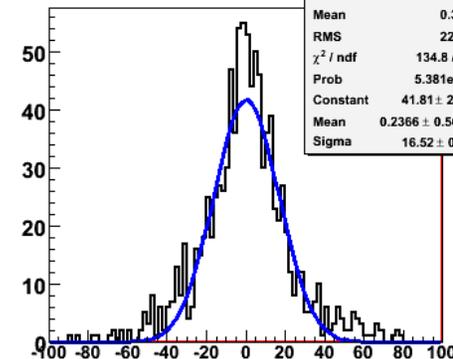
Fit by DC Algorithm

METTask_CaloMExNoHF_LS



Entries	1000
Mean	0.034
RMS	22.82
χ^2 / ndf	113.2 / 72
Prob	0.00141
Constant	42.6 ± 2.0
Mean	-0.8155 ± 0.5613
Sigma	16.63 ± 0.53

METTask_CaloMEyNoHF_LS



Entries	1000
Mean	0.364
RMS	22.45
χ^2 / ndf	134.8 / 70
Prob	5.381e-06
Constant	41.81 ± 2.04
Mean	0.2366 ± 0.5687
Sigma	16.52 ± 0.58



Determining Data Quality in a LS



$$\text{JetMET_MET_XXX} = \text{JetMET_MET_MEx_XXX} * \text{JetMET_MET_MEy_XXX}$$

```
run, lumi-sec,      tag name, output
1   0           JetMET_MET      1
1   0           JetMET_MET_A11   1
1   0           JetMET_MET_NoHF  1
1   1           JetMET_MET      1
1   1           JetMET_MET_A11   1
1   1           JetMET_MET_NoHF  1
1   2           JetMET_MET      1
1   2           JetMET_MET_A11   1
1   2           JetMET_MET_NoHF  1
1   3           JetMET_MET      1
1   3           JetMET_MET_A11   1
1   3           JetMET_MET_NoHF  1
1   4           JetMET_MET      1
1   4           JetMET_MET_A11   1
1   4           JetMET_MET_NoHF  1
1   5           JetMET_MET      1
1   5           JetMET_MET_A11   1
1   5           JetMET_MET_NoHF  1
1   6           JetMET_MET      1
1   6           JetMET_MET_A11   1
```

JetMET_MET_MEx_XXX
XXX = All, NoHF

**Distribution fit with a
double Gaussian**

**If mean and chi2 are within
tolerance then set = 1**

Actual output of Data Certification Algo (using MC)



Other Possibilities



We could do the fitting in the POG monitoring but we need some way to propagate the information to the merged root file

Can we use a ntuple-like structure?

Keep the structure simple and agree on rules to make maintenance easy

Run, LumiSection, Histold, Mean, Chi2

What other options are available?



Data Certification Algorithm



Data Certification runs off of the **merged root file**

Algorithm runs as a separate process (root script), details specified in one place...

Produces a text file with the results

Need to have the DBS table defined...

DC file can be read by perl script that fills DBS

Agree on format of Data Certification File



Data Certification File



Agree on format of the Data Certification File

Initial conditions written out for LumiSection=0

Write out condition whenever there is a change

Run	LumiSection	TagName	TagValue
1	0	JetMET_Global	1
1	0	JetMET_Jet	1
...			
1	56	JetMET_Jet	0
1	108	JetMET_Jet	1



Shifter Instructions

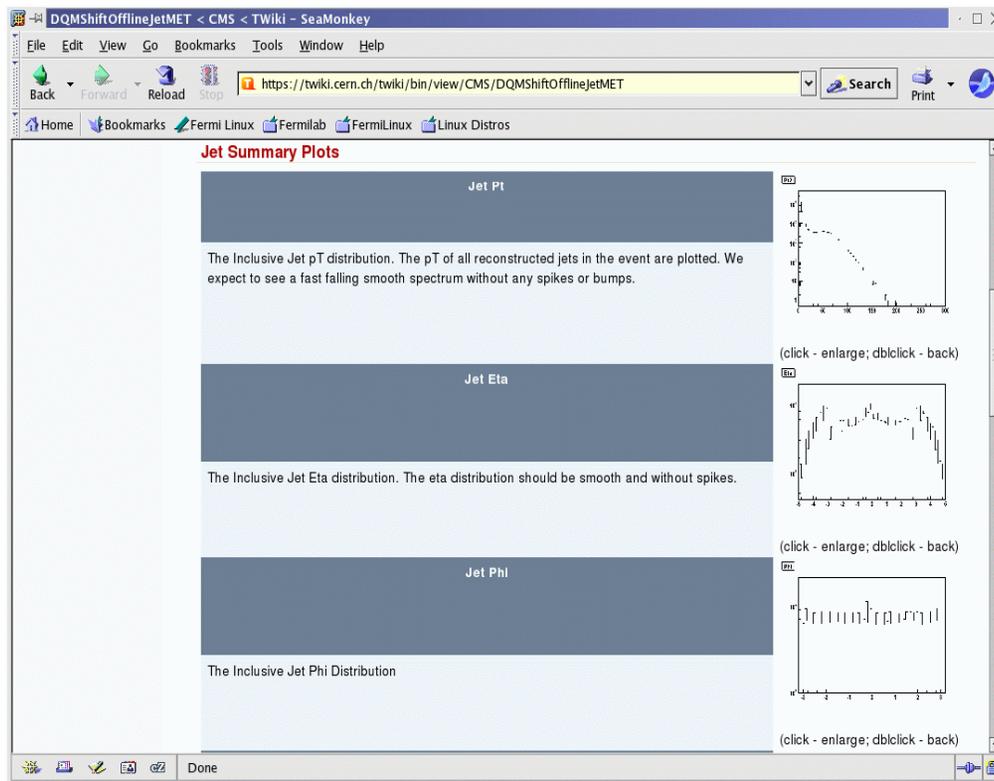


Filled in the template for Shifter Instructions

Used MC to provide reference histograms

*Not very useful for
cruzet data*

Need to:
Specify trigger path
Provide *bad examples*
Review histograms
Enhance descriptions





Common Issues



Determine Data Quality per Luminosity Section
Best way to save info in merged root file?

Interface to Offline DBS
Format of Data Certification File
Make sure all special cases are handled...

Keeping track of versions
How/where do we redo data certification?

Archiving merged root files



Next Steps



Finalize DBS contents

Define Data Base table

Specify how to carry forward LS information

2d histogram, ntuple, other...

Agree on format of Data Certification File

Select trigger path

Determine additional Data Quality Flags

Compare to reference plots...



DPG DQM



Will rely on HCAL and ECAL DPG DQM

Have been in contact with HCAL DPG

Important to have detector granularity

Now have a DataBase query which returns the DCS conditions for a run

```

Run          |-----1-----|
File         |----1----|---2---|---3---|
Run Section  |-1-|-2-|-3-|-4-|-5-|-6-|-7-|-
DAQ          |-1-|-1-|-1-|-1-|-1-|-1-|-1-|-
DCS-HB      |-1-|-1-|-1-|-1-|-0-|-0-|-1-|-
HB           |-1-|-1-|-1-|-1-|-1-|-1-|-1-|-
DCS-HO      |-1-|-1-|-0-|-0-|-0-|-1-|-1-|-
HO           |-1-|-1-|-0-|-0-|-0-|-1-|-1-|-
DCS-EB      |-1-|-1-|-1-|-1-|-1-|-1-|-1-|-
EB           |-1-|-1-|-1-|-1-|-0-|-1-|-1-|-
Returns
Files        |----1----|          |---3---|
Run Section  |-1-|-2-|-0-|          |-0-|-7-|-

```



Summary



We developed a fully working *start to end* example

Can read MC or CRUZET data

Produces a Data Certification File which can be used to fill DBS

Some details still need to be settled...

Need universal solutions to common problems