JetMET POG DQM and Data Certification

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Requirements / Assumptions

Provide data quality feedback to identify good data for analyses using *Jets and MET*

POG will monitor Jet and MET physics objects

Jet and MET analyses rely on the DPG HCAL and ECAL monitoring

Need quality for detector segmentation

Barrel, EndCap, Forward

Need data quality *per luminosity section*

DPG HCAL and ECAL DQM

We *assume* that DCS will be used for DPG DQM

In particular HCAL and ECAL DPG DQM

DCS provides finer time granularity

Some issues with DCS:

Data not organized per run

Only transitions are saved

Timestamps not lumisections

Query is expensive (takes ~minutes)

Need to find the time of the run start and go back in the database to find the last change…

DCS Queries

We have several DCS queries which return HV/LV settings for the HCAL

wget -q -O file.txt "http://cmsmondev.cern.ch/cmsdb/servlet/TestSelectToFile ...

Example output:

```
2008.07.11_10:28:52 HFM_HV/M1 9 222.100006103516
2008.07.11_10:28:54 HFP_HV/M5 9 219.100006103516
2008.07.11_10:29:01 HFM_HV/M1 9 219.899993896484
2008.07.11_10:29:07 HFM_HV/M1 9 222.199996948242
2008.07.11_10:29:09 HFP_HV/M5 9 216.800003051758
2008.07.11_10:29:12 HFM_HV/M1 9 219.699996948242
2008.07.11_10:29:21 HFP_HV/M5 9 218.899993896484
```

Written to a file/run which can be parsed by the data certification algo

How do we do this directly in the "Harvest Step"?

DPG DQM

```
    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-|-
```

User Interface to Good Run Bits

User specifies subdetectors needed for analysis

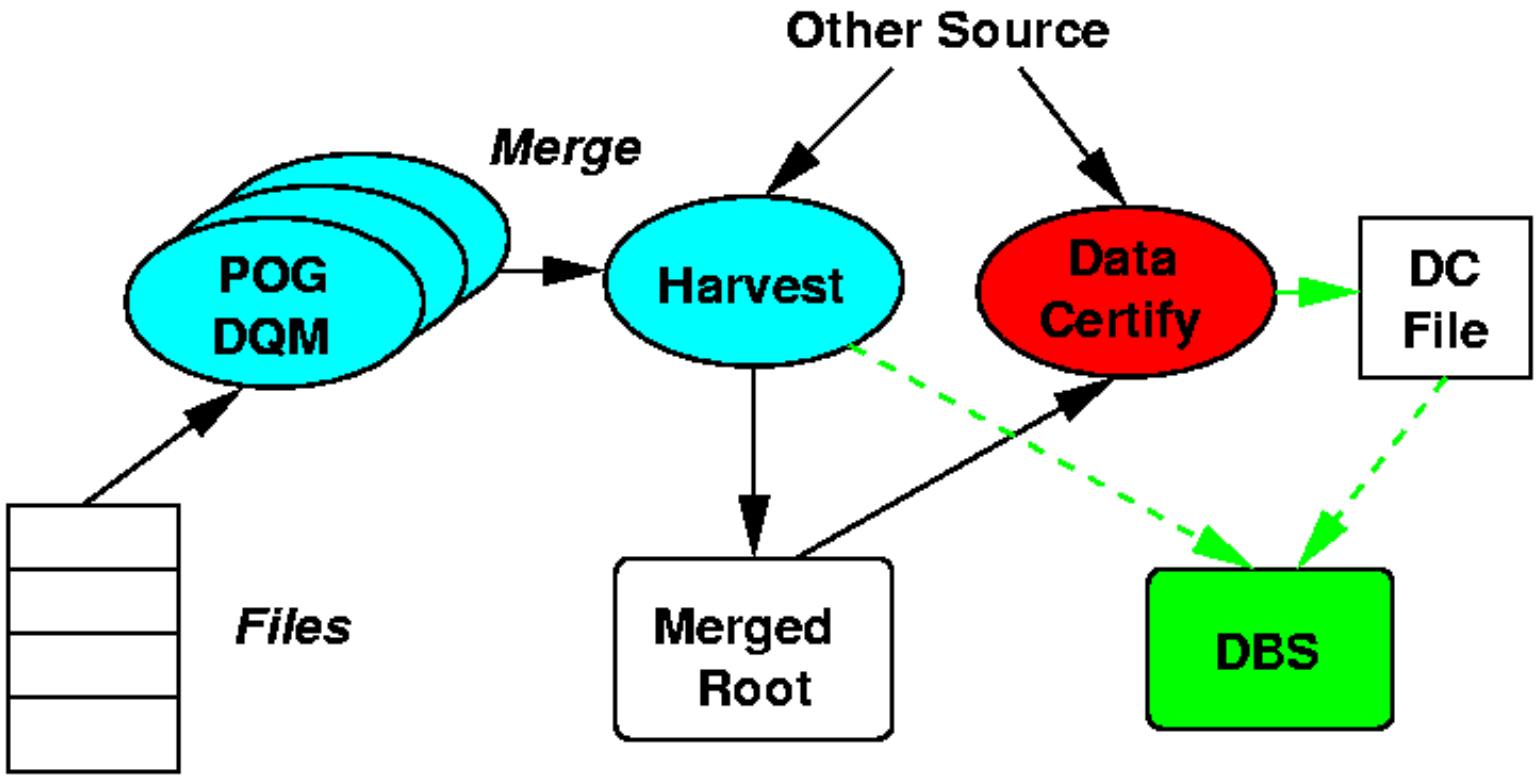
For a basic jet analysis in the central region:

run start, run stop,
HB, EB, HO, Tracker, Luminosity,
(JET_Barrel)

Data Handling returns the dataset which satisfies the query…

Able to skip over bad Luminosity sections

Data Certification Step



Data Certification algorithm runs as a root script over the "Merged Root" file (can move into harvest)

Writes results to a "Data Certification File"

Functional Description

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

Layer 1	Layer 2	Layer 3
JetMET_Global	JetMET_Jet	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) jet pT triggers

Using DQM Info

We followed the three layer structure

People doing Jet analyses will be interested in the information in "Layer 3"

They will want to know if the data is "good or bad"

Will not use floating point quality values

We monitor several Jet algorithms

ICone, SISCone, PFJets, TrackPlusJets

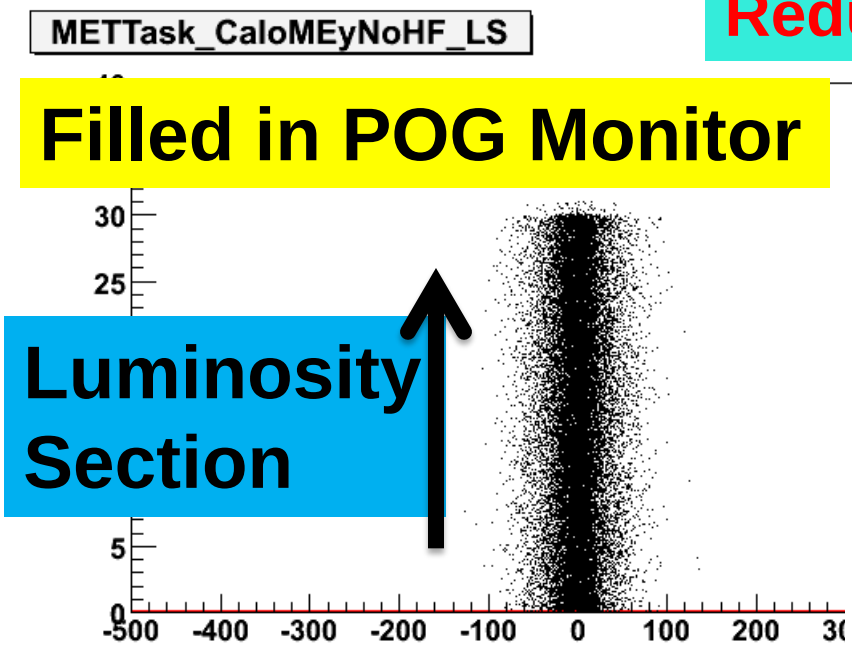
May expand quality bits for each type of jet algo…

Can expect DCS table to evolve…

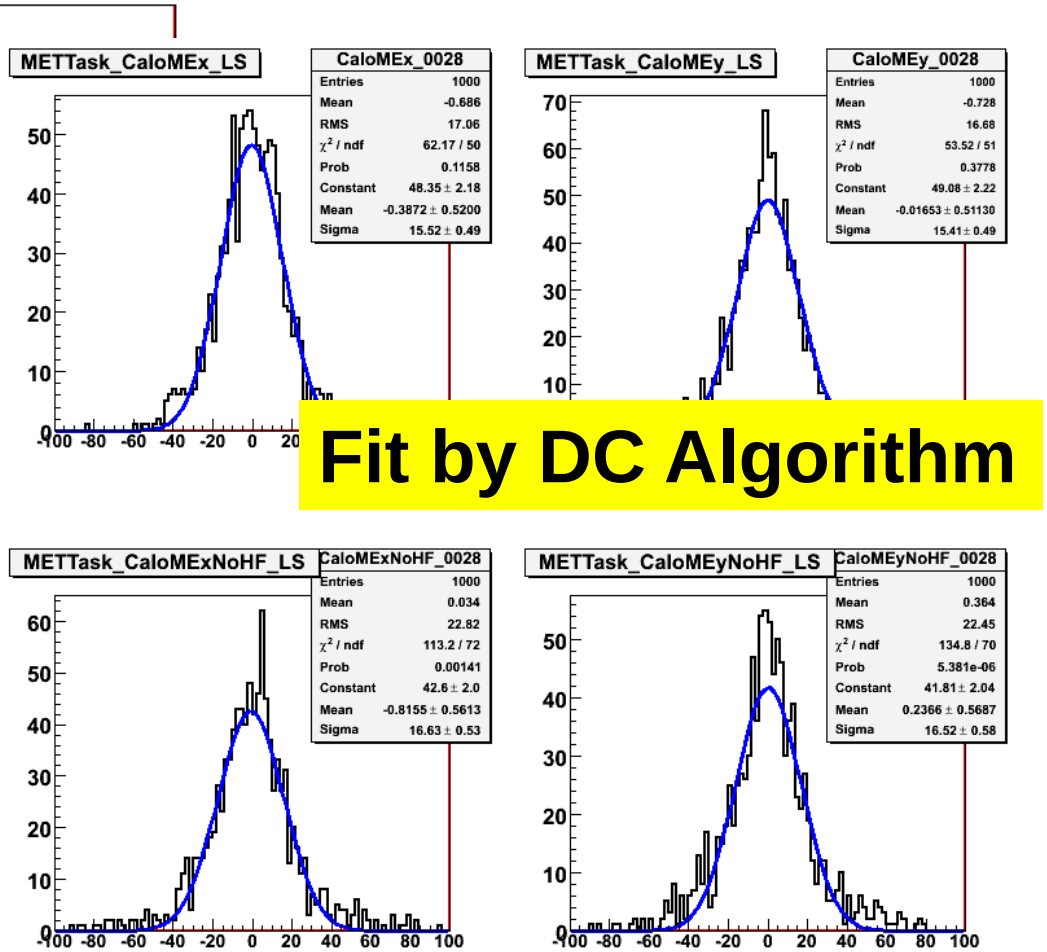
Determining Data Quality in a LS

Reduced bins 1000x2000 →200x500

Filled in POG Monitor



Luminosity Section



Fit by DC Algorithm

Fill a 2d histogram

Take projection and fit to get mean and chi2

Determining Data Quality in a LS

JetMET_MET_XXX = JetMET_MET_MEx_XXX * JetMET_MET_MEy_XXX

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

JetMET_MET_MEx_XXX

XXX = All, NoHF

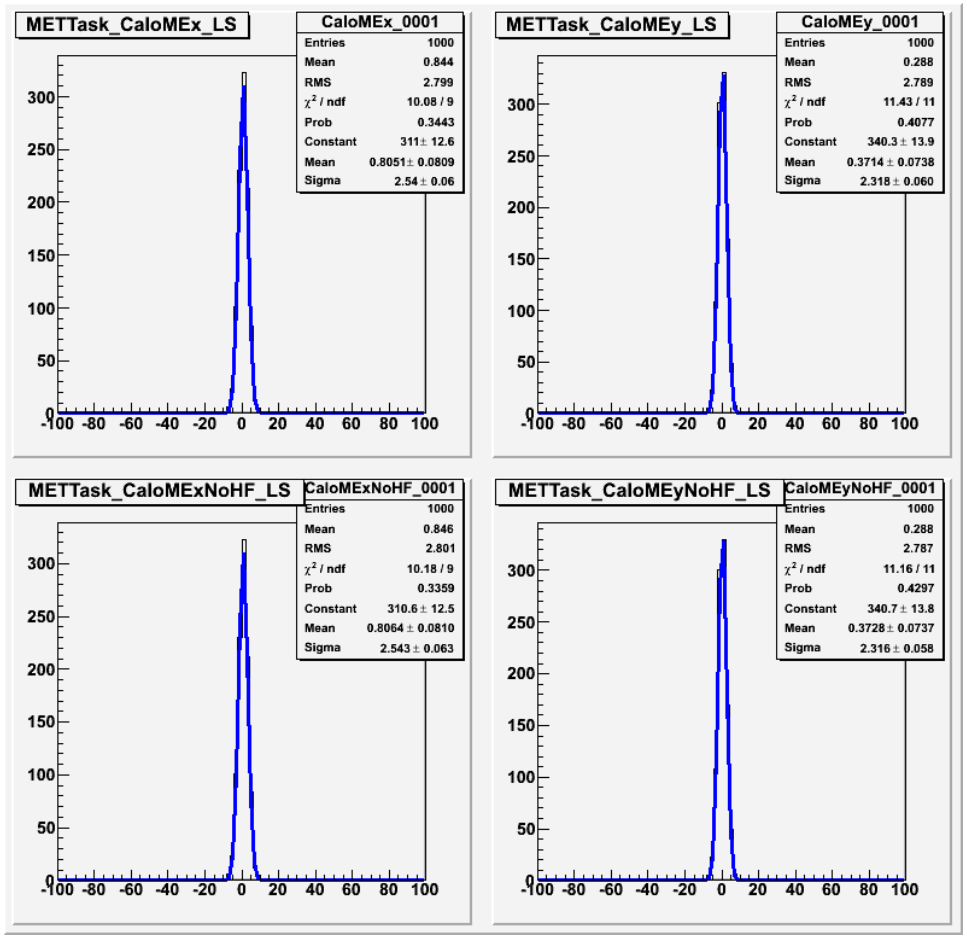
Distribution fit with a double Gaussian

If mean and chi2 are within tolerance then set = 1

Actual output of Data Certification Algo (using MC)

Data Certification for CRUZET4

We also ran the JetMET DQM on CRUZET4 data



Produced a root file

Ran the Data Certification script

Produced a DC File

For this test:

LS = nevent/1000

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
2	108	JetMET_Jet	1

Format is similar to how the data is saved in DBS

Approach can be used by other components…

Summary

We developed a fully working *start to end* example

Tested on MC and CRUZET data

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

Some details still need to be settled…

JetMET POG monitoring is useful for physics data and not really appropriate for CRUZET runs

Like to get the updates included in current DQM

Summary

Want to have all information needed to run data certification contained in the "merged root file"

Info per luminosity section (2d histogram)

Reference histograms

Want to setup a preliminary DBS table for JetMET

Expect the definition to evolve…

Who does this?

Modular (Lego) approach

DC root script ↔ Harvesting Step

DC File ↔ Direct Write

Need Help With

Create DBS table

Who can do this?

Example of where to plug the DC algo into the harvesting step

Want to have a standalone example for development

DCS query was using servlet on cmsmondev

Can we use an alternative machine?

Want to have updated JetMET code run online