

# Data Quality

DØ Collaboration Meeting

10th October 2003

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# Introduction

- Data Quality is important
- Workshop in Beaune partly dedicated to Data Quality
- What happened since then?
  - \* Online effort
  - \* RecoCert
  - \* Offline effort
- Data Quality webpage:

[http://www-d0.fnal.gov/computing/data\\_quality/dataqual.html](http://www-d0.fnal.gov/computing/data_quality/dataqual.html)

# Online Effort

- Several Detector / Data Quality monitoring tools in the control room
- Significant Event System
  - \* Catches an increasing number of hard- and software problems
  - \* Pauses the run when needed
- DAQ Artificial Intelligence
  - \* Notifies shifter of abnormal conditions
  - \* Automatic fixes
- Detector examines: all subdetectors (including Lumi, FPD)
- Global examines: vertex, physics, trigger (objects and cross sections)

# Detector Examines

- Examine programs are well developed, but . . .
- Short term improvements, already happening:
  - \* Standardization, speed, easier and more secure operation
  - \* Convert to ROOT-based histogram browser (`gmbrowser`)
  - \* Combine examines:
    - CFT/CPS/FPS/. . . → “VLPC-detector” examine (Notre Dame)
    - Cal/L1Cal → `dq_cal0`
- Longer term improvements:
  - \* Auto start examine at start of run
  - \* Auto-generate alarms from examine to SigEvtSys

# Global Monitoring

- Tracks / Beam position (VertEx)
  - \* Beam position now used by L3 trigger
- Trigger objects (TrigEx), cross sections (ImTrigger)
  - \* ImTrigger needs improvement !
  - \* New tool to monitor L1/L2 trigger rates (trigstripmon)
- Physics objects (PhysEx)
  - \* Valuable input from Muon group
  - \* Suffers from slow reco
  - \* Multiple PhysEx ready to go, since a long time. . .

# Global Monitoring

- ROOT-based histogram browser (`gmbrowser`) now well developed
    - \* Easily configurable
    - \* Can display “reference” histograms on top of “current”
    - \* Can run specialized plotting macros
    - \* Can be run outside the control room and access live histograms
    - \* Well supported within DØ, and also by ROOT-team
- ⇒ Should be used by all examines !

# Global Monitoring Issues

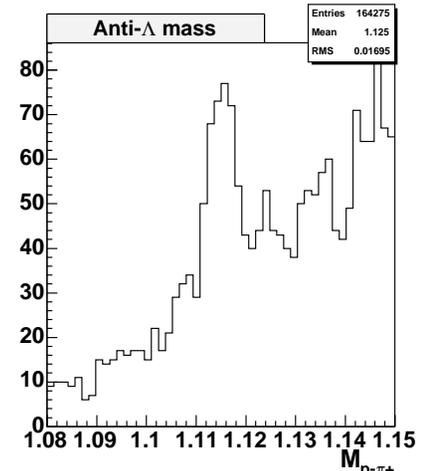
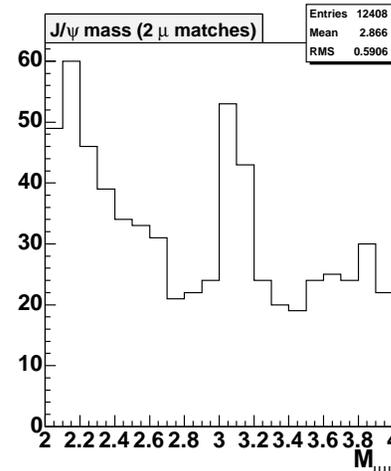
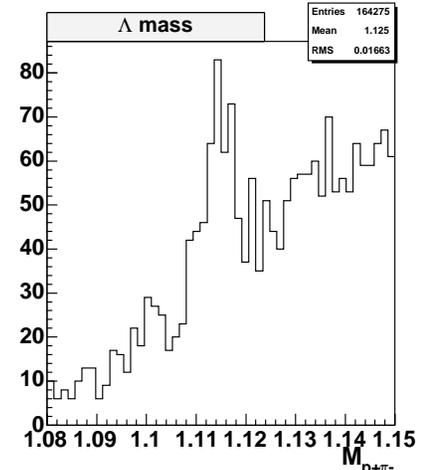
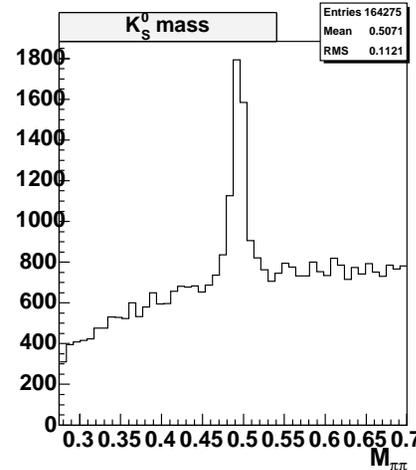
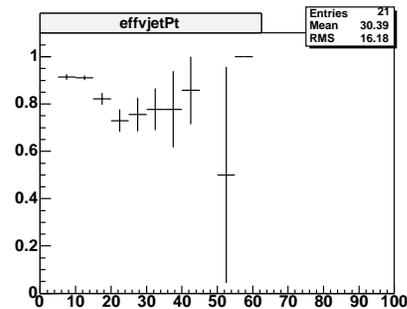
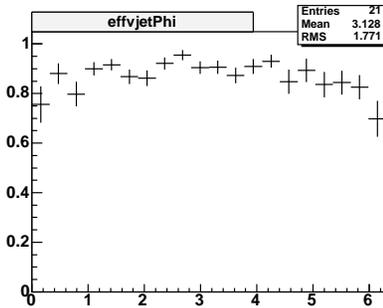
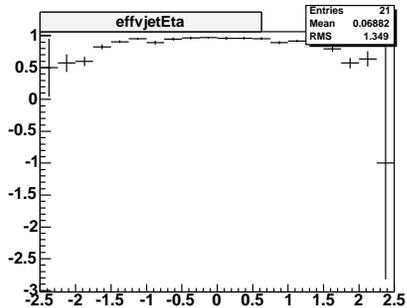
- See Arnd’s talk: “technical, psychological & organizational issues”
- Reference histograms:
  - \* Trigger list / prescale changes, hard to have a stable reference set
  - \* Physics Examine(s) will run on few triggers only, after shutdown
- Interaction between (remote!) GM shifter and other shifters
  - \* Recognize presence and value of GM shifter
  - \* Need support from detector groups
- Not all GM shifts are filled
  - \* Consider merging Captain & GM shifts ?

# RecoCert

- Package to histogram basic reco output quantities
- Histograms for Jets, Tracks, Muons, Hits, Vertices, . . . (50 pages)
- Very easy to run (`runRecoCert`)
- More and more used, contributions from many people
- New:
  - \* “B physics” resonances
  - \* Reco CPU time per event
  - \* Jets for event with  $\cancel{E}_T > 20$  GeV

# RecoCert Example

24k events, run 180796, p14.03.02



Tracks/event = 54.85

SMT-only tracks/event = 8.16

CFT-only tracks/event = 11.03

Overall isolated tracking efficiency: 99.08 +/- 0.32 %

Overall tracking efficiency in jets: 89.70 +/- 0.72 %

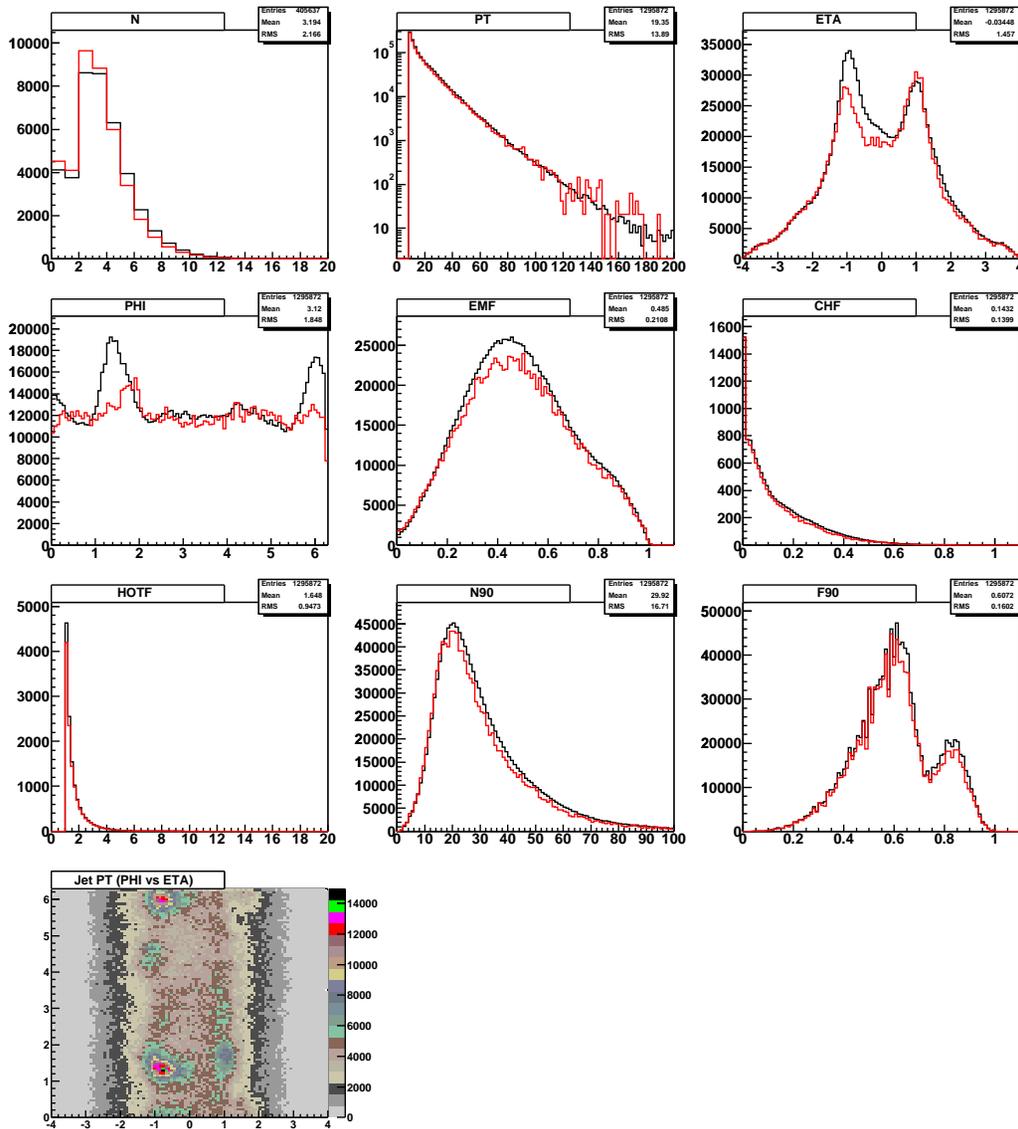
# RecoCert Future

- **You** are the future !
- Is used for remote reprocessing certification
  - \* Web-based “RecoCert Browser” (Imperial College)
- Will be run online (on limited statistics)
- Run on all data ?
  - \* Who will look at output ?
  - \* RecoCert is still growing
  - \* Some technical issues

# Offline Effort

- Offline / SAM shifters run RecoCert
  - \* Recent run, or special requests
  - \* Compare to reference run
  - \* Observations into (online) logbook
  - \* Completed 61 times since 1st July 2003
  
- “Punchlist”
  - \* List of Data Quality issues, actions and resolutions
  - \* Items from control room, offline shifters
  - \* Mostly calorimeter and tracking
  
- Regular reports in All DØ Meeting

# Offline Effort Example



Jets (Cone R=0.7 - no cuts)

- Calorimeter problem observed during data taking in the control room
- Ran RecoCert offline
- ⇒ No calibration done after BLS power-supply change

# Offline Effort “To Do”

- More input needed from detector / physics groups !
- Pre-reco certification
  - \* “Fix” data before reconstruction
  - \* Example: dq\_cal0/cal\_corr\_dst (Orsay/Grenoble)
    - Look for hot cells, flag them before reco
    - Will also run in the control room
  - \* dCache
- Automatic post-reco certification
- What is done with online information ?
  - \* Hot cells
  - \* Readout problems

# Summary

- Online Data Quality (Monitoring) is being improved
- RecoCert is growing up
- Offline effort is benefitting from RecoCert

⇒ But there is no time to relax yet !