ICD Status

- ADC to GeV Conversion
- cal_examine Plots
- Mapping
- Other issues

Based on investigations by Alan Stone, Andy White, Leo Chan, Dean Schamberger, Lee Sawyer, Vishnu Zutshi and Bob Kehoe

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DØ Collaboration Meeting
ICD Cosmic Ray Test Stand Results

- Convert Test Stand ADCs to DØ Calorimeter ADCs
  - Used CAL instead of ICD type preamps
    - Better separation between pedestal and MIP peak
  - Test stand signal boost by factor of 8.7
  - Least count of test stand ADC was 1 mV & for Calorimeter it is 0.1 mV

Average MIP Peak (368 channels) from data taken in Spring 2001 was 135.7 ADC Counts.
ADC to GeV Conversion

- **Average MIP peak in Calorimeter ADCs**
  
  \[
  \frac{135.7 \times (1.0/0.1)}{(22.5/5.5) \times 8.7} = 38.13 \text{ ADC counts}
  \]

- **dE/dx_{min} = 2.02 \text{ MeV/cm} \quad (PVT Scintillator)**

- **Energy deposition in ICD tile**
  
  \[
  \left(\frac{\text{CAL ADC counts}}{38.13}\right) \times (2.02 \text{ MeV/cm}) \times 1.27 \text{ cm}
  \]

  \[
  \text{(CAL ADC counts)} \times (0.0000673) \equiv [\text{Energy in GeV}]
  \]

- **Correct for flipped resistors** *(factor of 32/23)*

  \[
  \text{(CAL ADC counts)} \times (0.0000936) \equiv [\text{Energy in GeV}]
  \]

  - Current factor in plt_latest.rcp is:
    
    \[
    \frac{1}{20000} \times \frac{32}{23} = 0.0000694
    \]

    - Change would increase the ICD energy reconstructed by 35%!

- **Current Reco version on farms is p10.15.01**

  - *caltables:* plt_latest.rcp \Rightarrow tag p10-15-01
What do we see in cal_examine for ICD?

Current version is t02.08.00
Took zero bias run, in normal, unsuppressed mode.

Average pedestal is 600 ADC counts
Vertical axis is $E_T$ in GeV.
What do we see in cal_examine for MG?

Average pedestal is 600 ADC counts
Vertical axis is $E_T$ in GeV.
And neighboring CAL layers...

Average pedestal is 600 ADC counts
Vertical axis is $E_T$ in GeV.
Address Changes in Software

- **caladdress:** `CalChan.cpp ⇒ tag p11-05-00`
  - Correction to ICD fiber backplane miscabling not tagged for production release
    - Eta is swapped (12↔14) for the NE & SW quadrants
    - Code fix made between 8-18 March 2002

- However, we wanted to do test online with `cal_examine` *(online version t02.08.00)*
  - 4 March: Call for release requests for t02.08.00
    - No `caladdress` in builds 1-4
  - 11 March: Call for release requests for t02.09.00
    - `caladdress` went from v00-03-06 to v00-03-07
  - 18 March: Call for release requests for t02.10.00
    - `caladdress` went from v00-03-07 to v00-03-08
      - This is the last tagged version by Bob Kehoe
New Address Feature

- New problem was found a few weeks ago
  - We looked at sets of 3 ICD channels from each CAL crate in which the ICD is readout
    - Crates 40, 41, 44, 45, 46, 47, 4A, 4B
  - Turned off all HV except for these 24 channels
  - Took “snapshot” of output in ADC counts & transverse energy in GeV
    - Then lowered HV for 1 in each 3 channels by 50 V
  - All channels in West appear phi swapped in output of cal_examine (but not in cal_elec)
    - Sent email to Bob Kehoe - not sure if this is a bug in caladdress, or if the problem is internal to the online version of cal_examine
Turned on ICD LED pulser. Turned off all HV except for channels shown. Reduced by 50V for a single channel in each group of three (each Calorimeter readout crate in which the ICD resides). Referenced ICD channel map. cal_elec is correct.
Before

CAL crate 1 (ICD NW12) & CAL crate 11 (ICD NE16)

cal_examine gives correctly $\phi = 15$.

After

cal_examine gives incorrectly $\phi = 26$
Should be 25.
Other Issues That Need Attention

• Isolated muons tracked through ICD
  - Verify MIP response in ADC counts
  • Channel to channel correction

• SCA non-linearity effects
  - Small contributions from ICD tiles to jets

• Calorimeter geometry
  - ICDmodule.hpp/cpp last modified 9 Aug 2000
    • Has anyone independently checked on this?
  - D0scan - different color scheme for ICD
    • George Alverson is currently working on this
Summary

- **ICD electronic output is working well**
  - cal_elec addressing is as expected
    - Verified with LED pulser
  - Only a handful of weak or dead channels
    - New PMTs are on hand & being tested
    - New motherboards are also at D0
    - We need to wait for major shutdown to get time & access to the East/West platforms

- **ICD response is at the mercy of the software**
  - We need to get into p11 right away:
    - Corrected addressing
    - Corrected ADC to GeV conversion