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**
  \[ \frac{135.7 \times (1.0/0.1)}{(22.5/5.5) \times 8.7} = 38.13 \text{ ADC counts} \]

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

- **Energy deposition in ICD tile**
  \[ \frac{\text{CAL ADC counts}}{38.13} \times (2.02 \text{ MeV/cm}) \times 1.27 \text{ cm} \]
  \[ \text{CAL ADC counts} \times (0.0000673) \equiv [\text{Energy in GeV}] \]

- **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 0.0000694
  - This would increase the ICD energy reconstructed by 35%!

- Assume for now that the weights are correct
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 \texttt{cal\_examine} for MG?

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

23 April 2002
Calorimeter Software Mtg

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And neighboring CAL layers...

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

• **Current Reco version on farms is p10.15.01**
  - *caltables*: `plt_latest.rcp` $\Rightarrow$ tag p10-15-01
    - Most recent, but it is using $1/20000 \times (32/23)$ for ICD
  - *caladdress*: `CPreAChan.cpp` $\Rightarrow$ tag p10-05-00
    - Correction to ICD fiber backplane miscabling not tagged for production release
      - Eta is swapped ($12 \leftrightarrow 14$) for the NE & SW quadrants

• **New problem was found a few weeks ago**
  - All channels in West are 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`
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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 $\varphi = 15$.

After

cal_examine gives incorrectly $\varphi = 26$
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