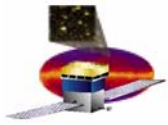


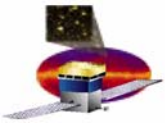
Calorimeter crosstalk measured with charge injection.

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NRL/GMU



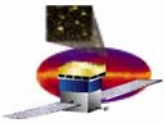
What we wanted to measure ?

- Crosstalk between adjacent crystals in the same layer
 - Required to explain strange behavior of LEX1 vs HEX8 intercalibration curve in the 100 GeV electron runs
- Crosstalk between crystals in different layers on the same board
 - Never seen, but could possibly contribute to incorrect energy measurement
- Crosstalk from LE to HE diode - how it depends on HE gain



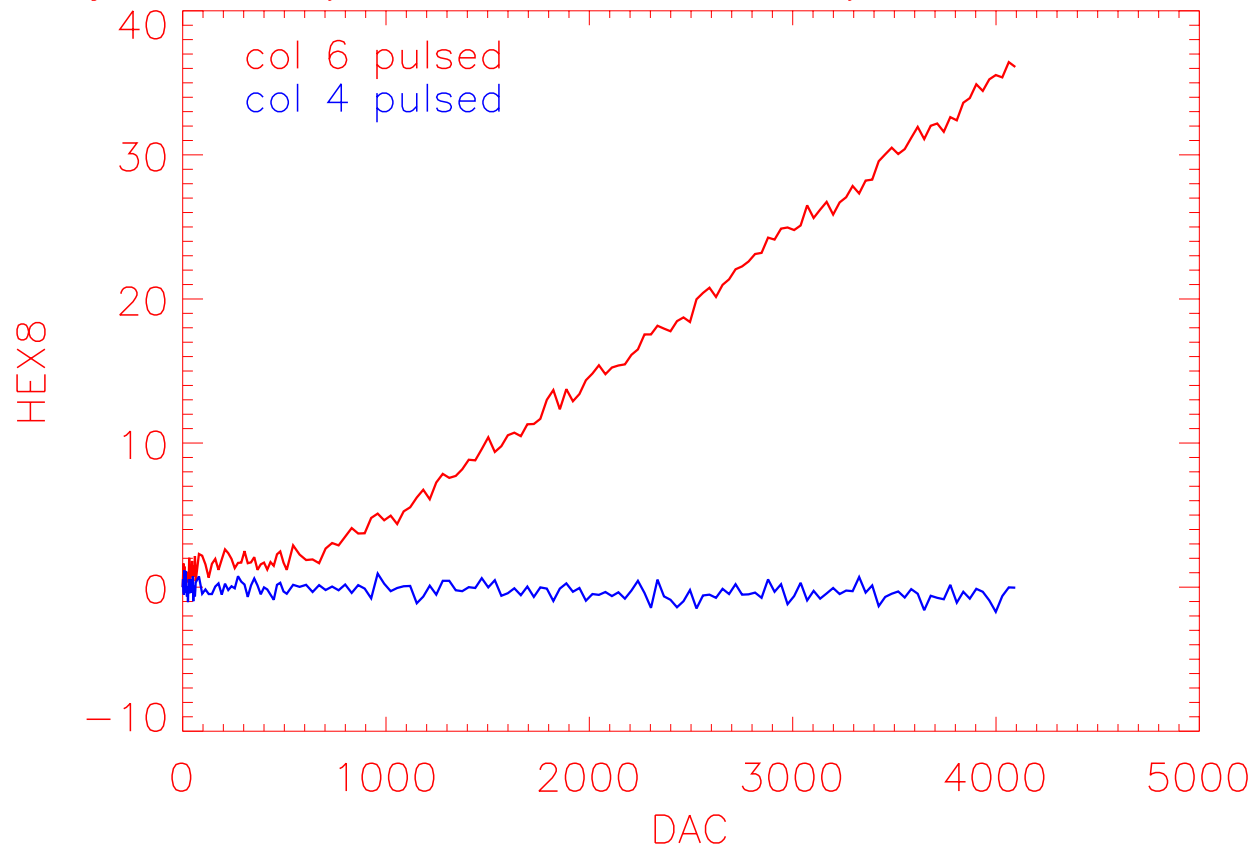
Measurement conditions

- Columnwise charge injection: to see the crosstalk signal in adjacent crystals, which are not pulsed
- Only one diode pulsed (LE or HE) - to measure crosstalk between diodes
- CALIB GAIN = OFF setting - factor of 10 different charge injection capacitors in LE and HE channels to simulate real signal ratio between LE and HE diodes
 - Real LE/HE signal ratio is ~ 5.6 - so the measured crosstalk signal is 1.7 times bigger than for the same signal in case of scintillation - should be taken into account
- Some runs with only one crystal pulsed - to look at possible crosstalk between different layers

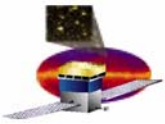


Crosstalk between adjacent crystals

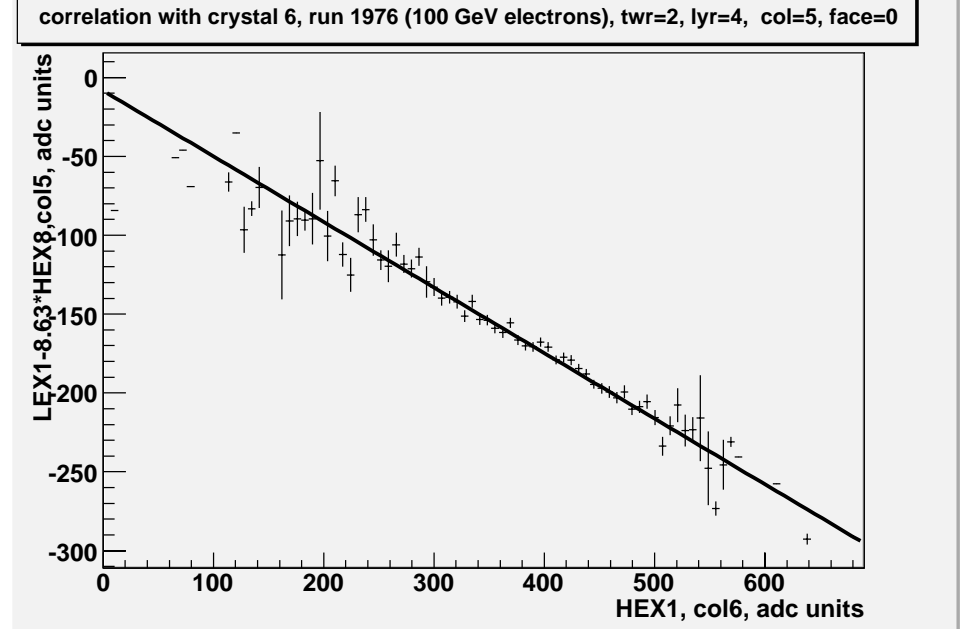
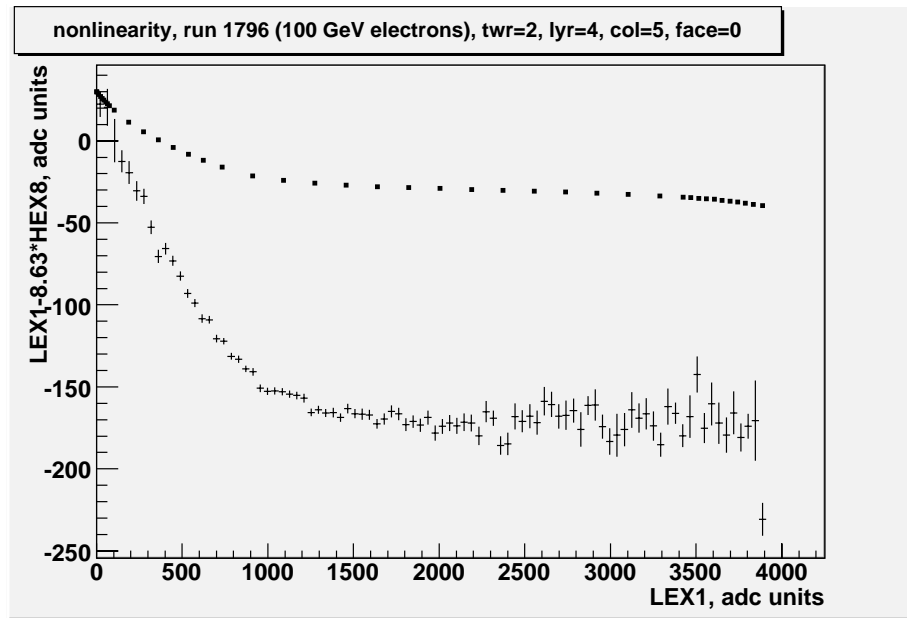
adjacent crystal xtalk: twr=2, lyr=4,col=5,face=+



- Crosstalk of ~1% from column 6, but no crosstalk from column 4
- This measurement could be used for correction during reconstruction

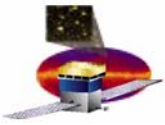


Nonlinearity for electrons: beam in column 6

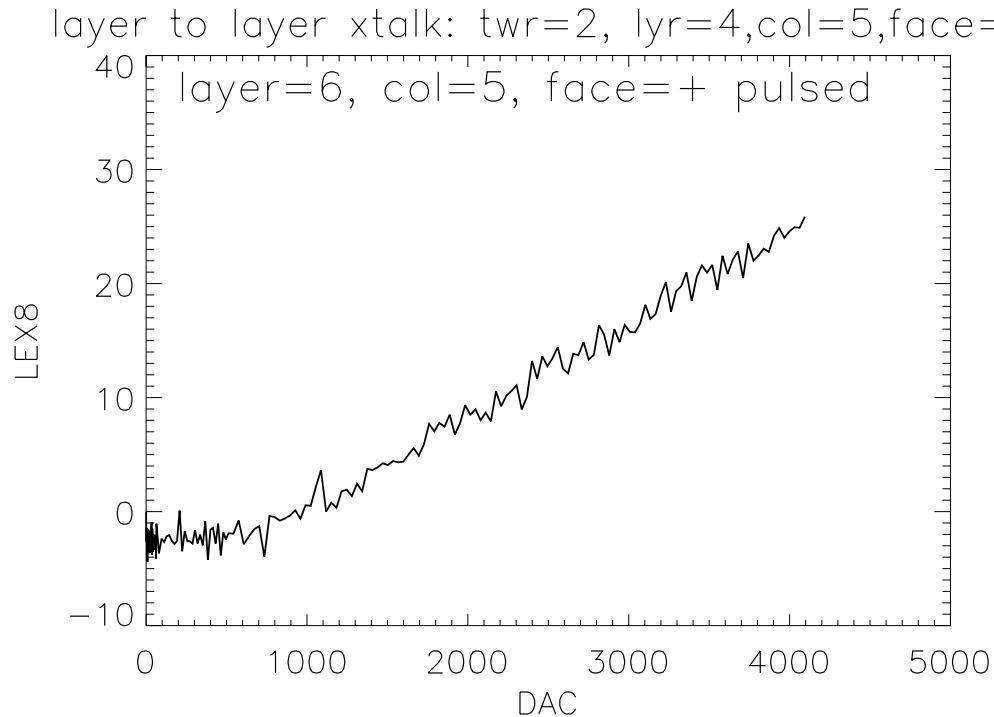


- When 100 GeV electron beam hits crystal 6 - nonlinearity curve for crystal 5 becomes very different from charge injection

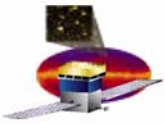
- Correlation of flat part (LEX1>1500) of the left plot versus HEX1 signal in the beam center (crystal 6)
 - Could be explained as a crosstalk from crystal 6 to crystal 5 with 0.5% amplitude



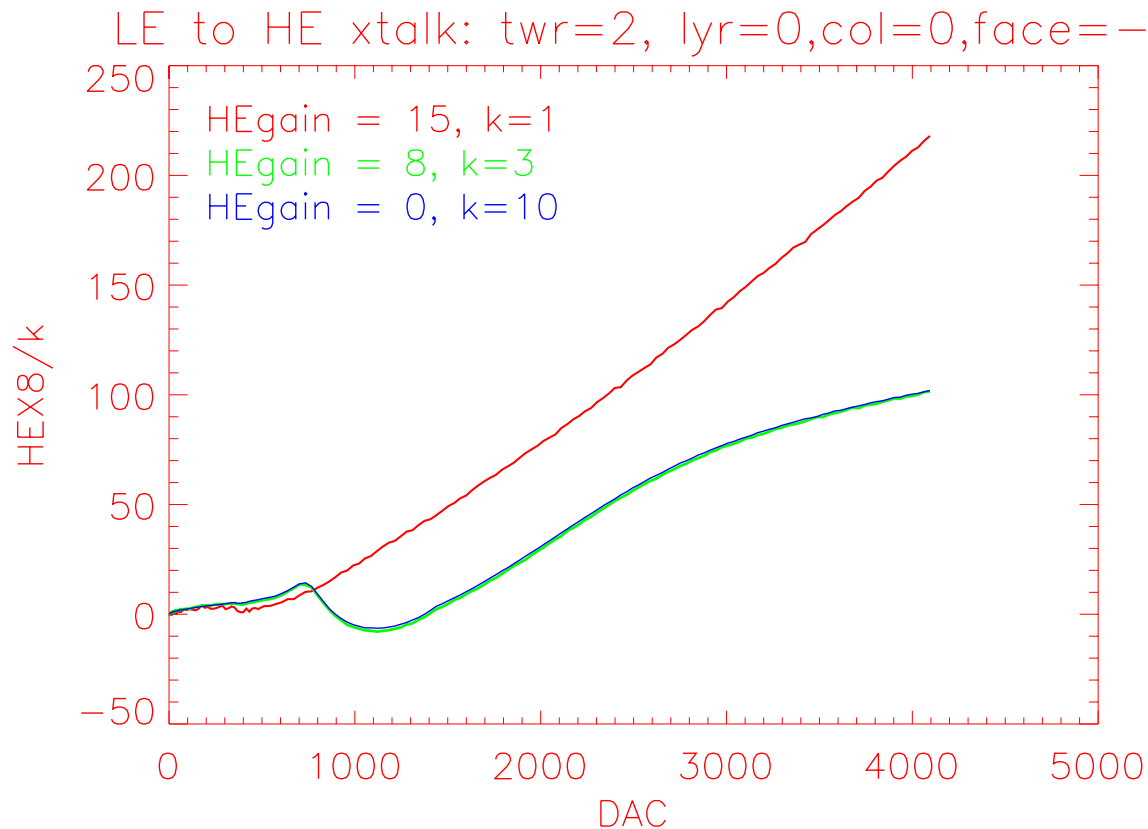
Crosstalk between layers



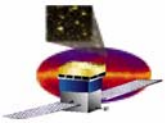
- Effect is very small: ~ 1 MeV for the signal of 12 GeV
- For now only 2 runs collected pulsing layers 4 and 6 on one board
 - Let's collect runs where we pulse other layers
- For now - effect is negligible and can't explain our calibration problems



LE to HE crosstalk versus HE gain



- We already saw the difference in crosstalk curve shape between flight gain (HEgain=15) and muon gain (HEgain=0, 10 times higher gain)
- The idea was to look at intermediate HE gain value (HEgain=8, 3 times higher gain)
 - The curve is identical to muon gain curve
 - Let's try intermediate HEgain values between 8 and 15



Conclusion

- The presence of the crosstalk between adjacent crystals in the same layers confirmed by charge injection
 - Modification of calibGenCAL needed to handle adjacent crystal crosstalk data
 - Additional correction has to be implemented in CAL reconstruction
 - Important for position measurement
- Crosstalk between layers is negligible - some more runs are needed to confirm
- LE to HE crosstalk shape changes between Hegain 8 and 15 - few additional ci runs are needed to understand.