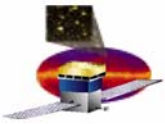
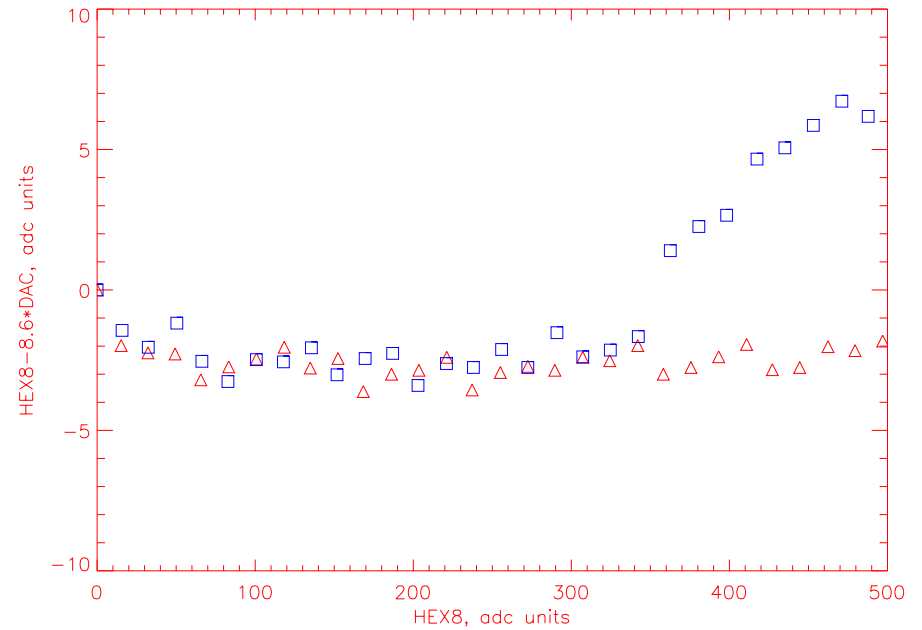
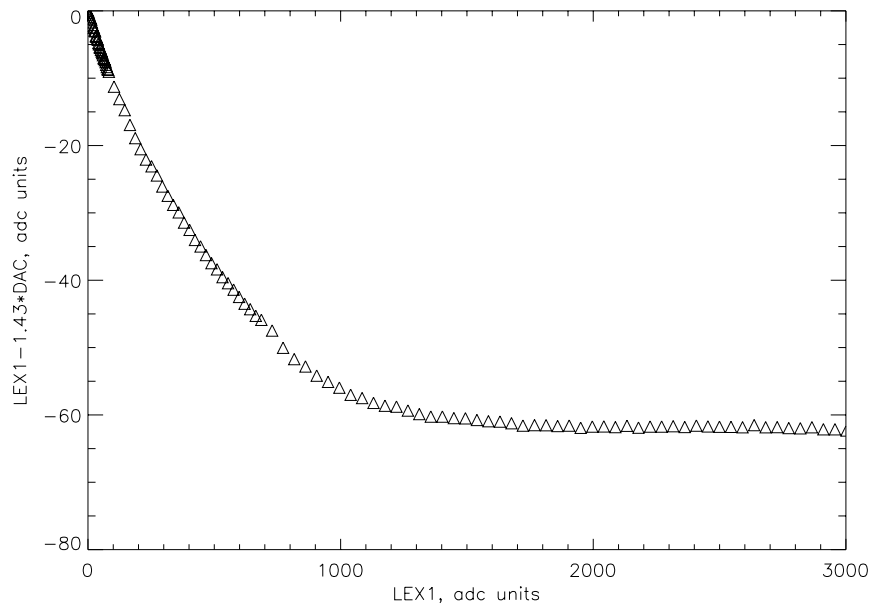


Calorimeter nonlinearity for electrons.

Alexandre Chekhtman
NRL/GMU



Nonlinearity measured with charge injection

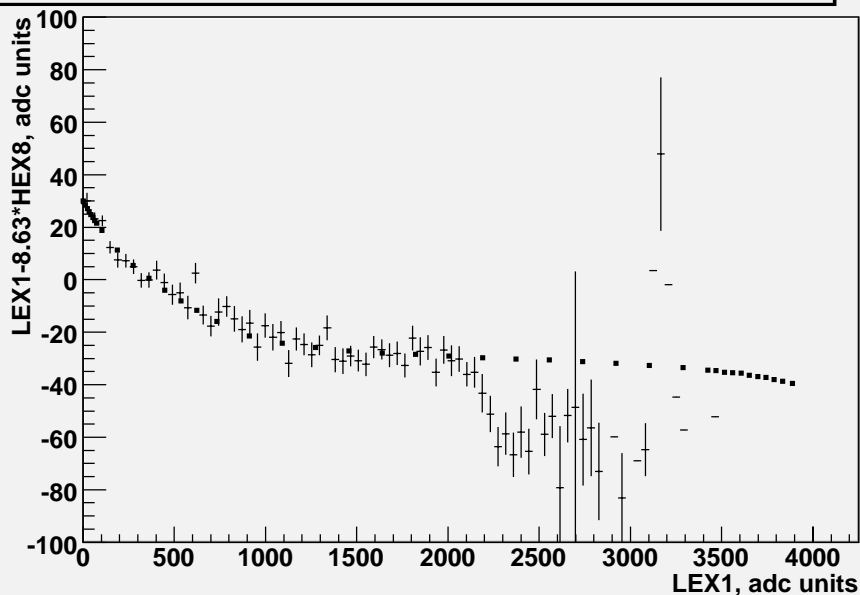


- Nonlinearity for LEX1
- Nonlinearity for HEX8
 - Red triangles - with FHE=127
 - Blue squares - with FHE=nominal
- In the region of overlap with LEX1 (HEX8<400) nonlinearity is small compare to LEX1
- For this study I will avoid the end of the region.

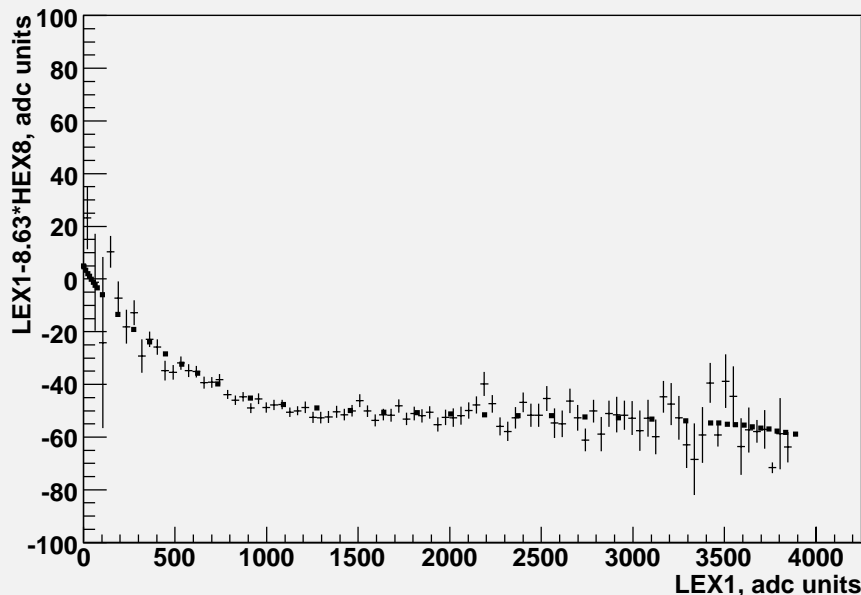


LEX1 nonlinearity for electrons

nonlinearity, run 706 (5 GeV electrons), twr=2, lyr=4, col=5, face=0

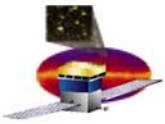


nonlinearity, run 1794 (100 GeV electrons), twr=2, lyr=4, col=5, face=0

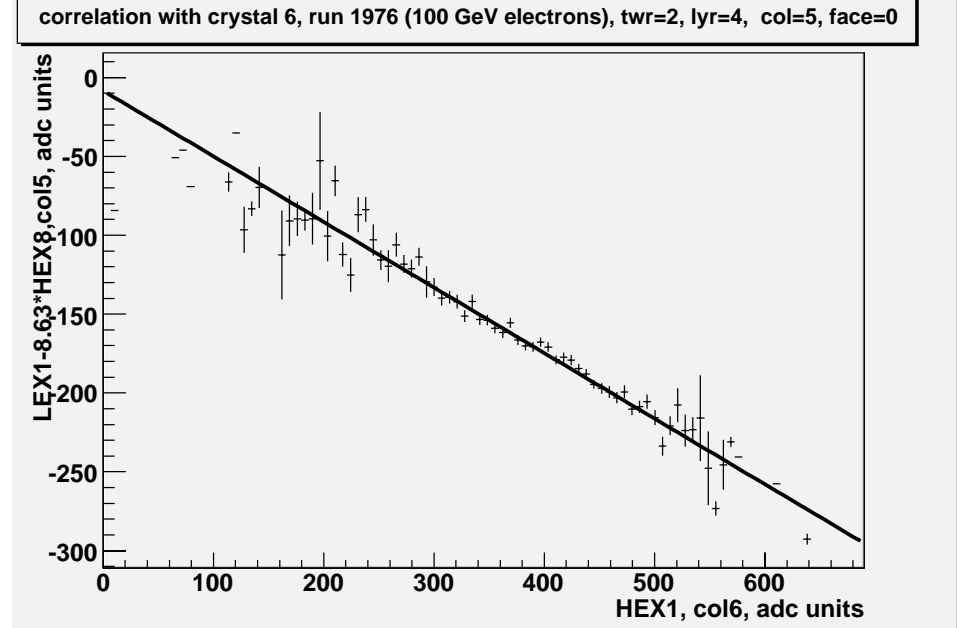
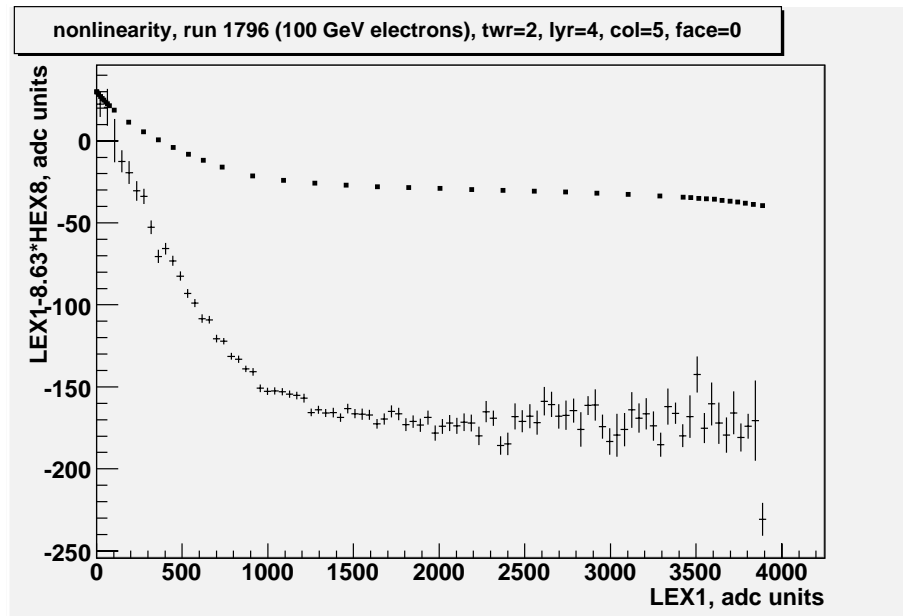


- LEX1 nonlinearity on the axis of 5 GeV electron beam
 - Squares - charge injection measurement
 - Deviation at $lex1 > 2500$ due to FHE crosstalk in HEX8 (see previous slide)

- LEX1 nonlinearity in crystal 5 when 100 GeV electron beam hits the crystal 4
 - Good agreement with charge injection

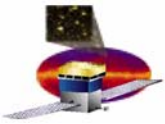


Nonlinearity for electrons: beam in column 6



- 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



Discussion

- Strange effect in the intercalibration of LEX1 and HEX8 ranges with electrons could be explained by crosstalk from adjacent crystal having much bigger signal.
- This crosstalk exist in many crystals, but strongly vary from crystal to crystal
- It is possible to extract the amplitude of this crosstalk from electron data and then make a correction during reconstruction.
- I suspect this crosstalk is related to the saturation of LEX1 range and thus could be nonlinear (similar to LEX1 to HEX8 crosstalk for the same crystal end)
- It is possible to measure this effect by columnwise charge injection providing the significant saturation of LEX1 range (CALIBGAIN=OFF)
 - May we turn on the calibration unit and collect this special charge injection run ?