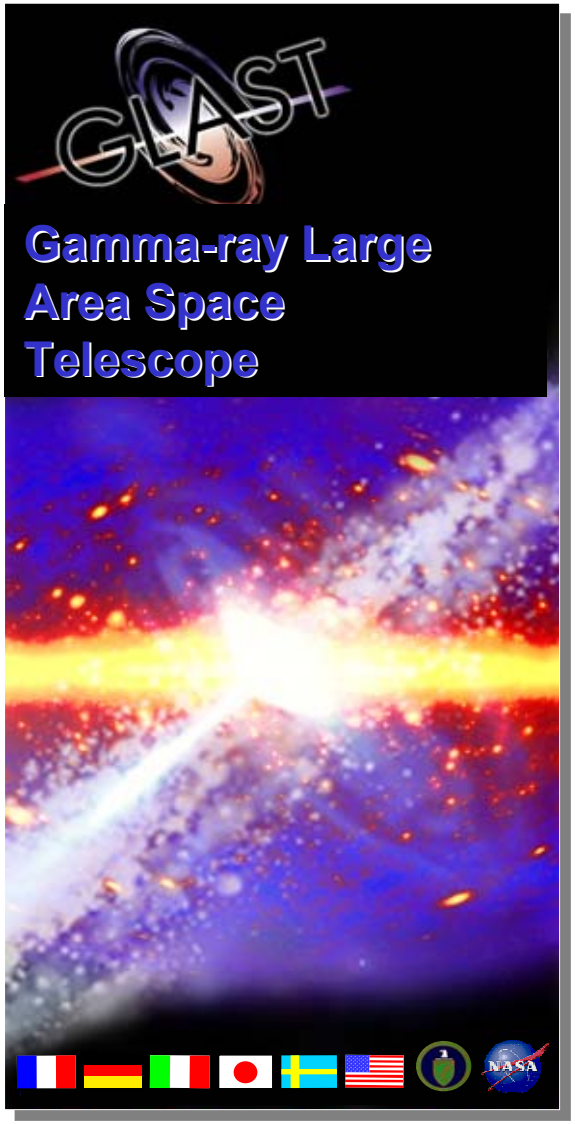
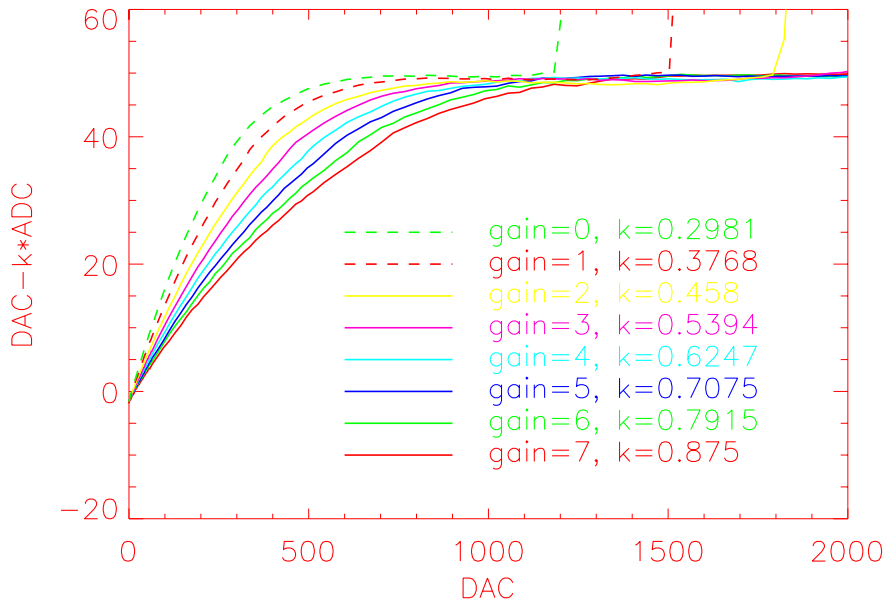
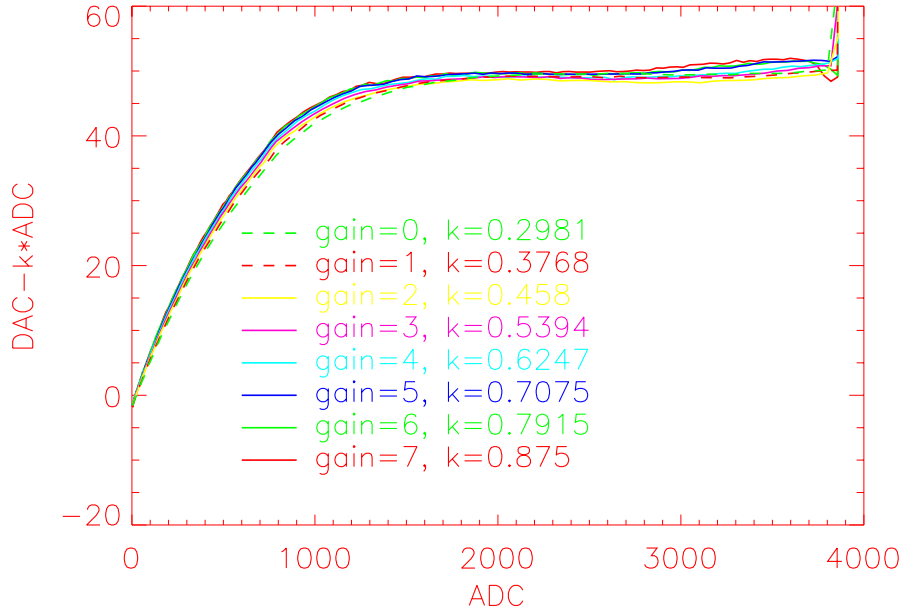



# Charge injection DAC nonlinearity.

**Alexandre Chekhtman**
**NRL/GMU**

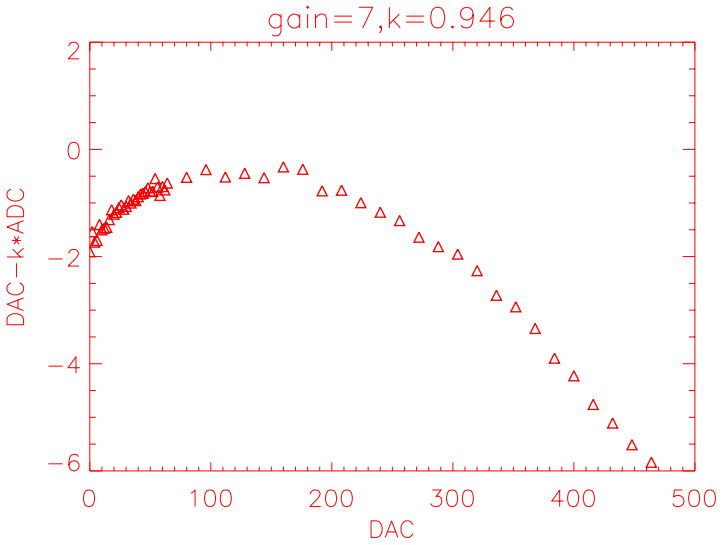
# LEX1 nonlinearity for different gain settings

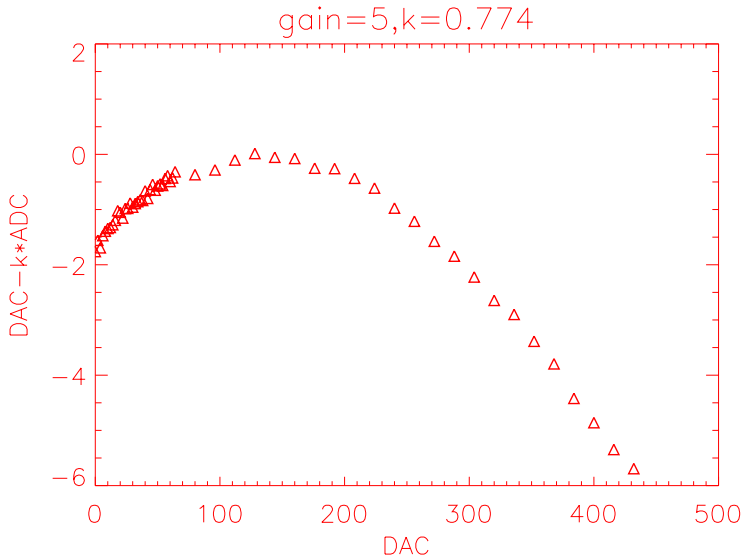


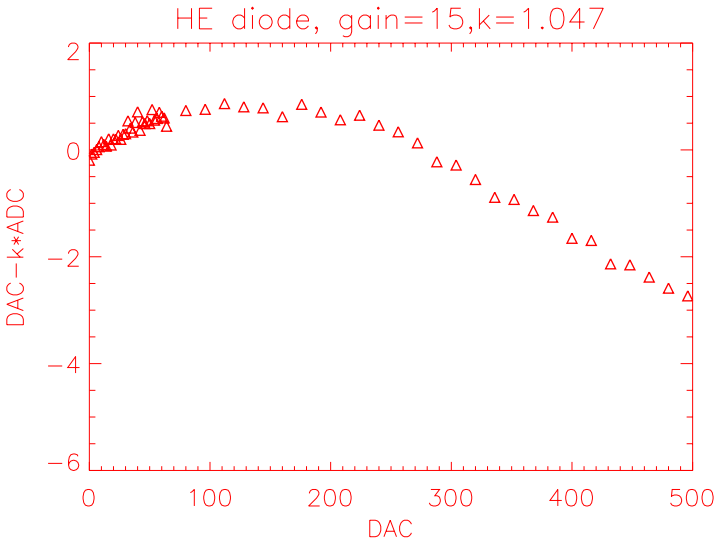




- Nonlinearity curve as a function of DAC changes with gain setting
- Nonlinearity curve as a function of ADC almost independent of gain setting
  - Consistent with a model containing some small parasitic feedback capacitance changing with output signal

# Zoom of small DAC region




- The part of nonlinearity curve at low DAC values contains significant changes of DAC/ADC slope happening at the same DAC value independently of gain (top left and top righ plots)
- Similar pattern could be seen for high energy diode (bottom left plot)
- This could be interpreted as DAC nonlinearity
- Difference in slope between region 0<DAC<32 and 300<DAC<400 is ~5%

# Discussion

- The same DAC is used for all channels of the same layer/side
  - DAC nonlinearity should be the same in both HE and LE diodes
    - From comparison of LE and HE plots on the previous slide – possibly not all effect is due to DAC nonlinearity
- If we suppose that the DAC nonlinearity is present in the region DAC < 300, we shouldn't use the charge injection measurement in this region
- Proposal: let's try to do linear extrapolation to this region from 300<DAC<400 and see if it will help to get HEX8/LEX1=1