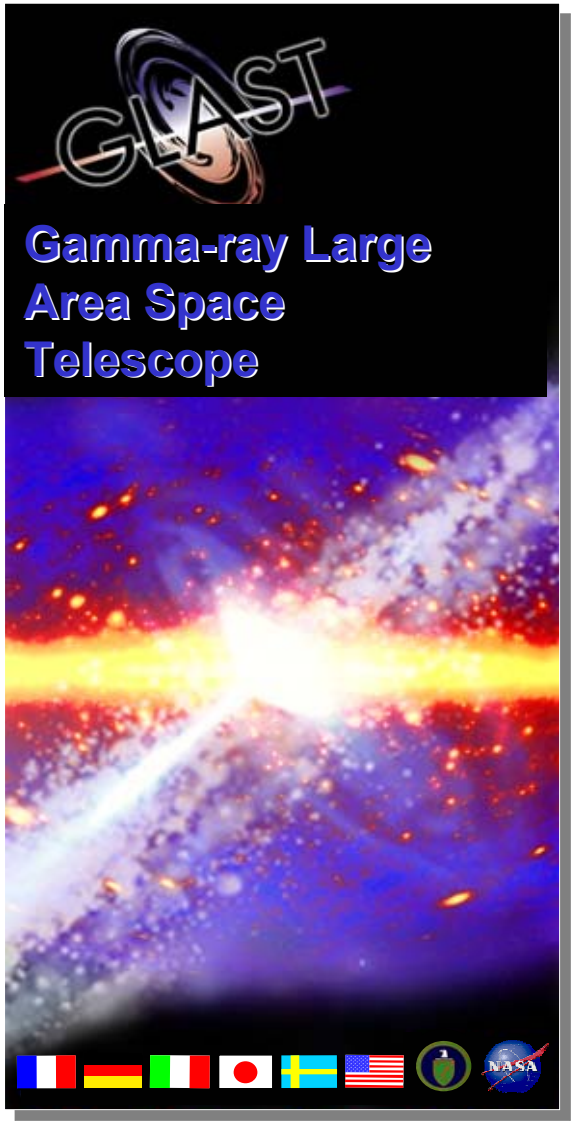

Beam test results and CAL calibration.

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What beam test gave to CAL calibration

- Beam test was extreamly useful – the first real data collected at high energies
- HEX8/LEX1 range intercalibration procedure at energies 200-800 MeV was tested and compared to interaclibration with muons at ~10 MeV
- several instrumental effects were found and corrected
  - Crosstalk from big diode to small diode of the same crystal
  - Crosstalk between adjacent crystals:
    - Correction of this effect significantly improved position measurement along the crystals
    - To correct this effect in LAT the special charge injection calibration run is needed – planned to be taken after TVAC
  - Charge injection DAC nonlinearity at the beginning of the range

Data/MC discrepancies

- Layer energies in data are bigger than in MC
- The effect is layer dependent: in layer 0 it is bigger (could be upto 20-30%) than it smoothly decreases to 5-10% at layer 7
- The variation with layer number depends on energy – it is more significant when energy increases to 280 GeV
  - But this variation exist for 5 GeV electrons, while for 20 GeV electrons the variation is almost 0
- The effect is similar for horizontal electron beam, but in this case we see variation with crystal number
  - This means, the variation depends on position along the shower, not on layer or crystal number
- The variation with layer number is much smaller for nonzero incident angle (30 degrees)
- The transvers shower profile (measured by CalTransRms) is ~10% more narrow in MC than in data
- Raw Energy peak for horizontal 280 GeV electron beam is higher than expected (by 8%), but is very narrow (better than 1%)
  - This couldn't happen in case of calibration coefficient varying from crystal to crystal

What does this mean for CAL calibration ?

- All our efforts to find and correct instrumental effects in CAL didn't affect MC/data discrepances
- It seems that the variable part of this descrepancy is due to some problem in MonteCarlo, which simulates longitudinal and transvers shower profile incorrectly
  - This is important to understand, because all energy corrections are based on shower profiles given by existing simulation
- The constant part of MC/data discrepancy could be due to some systematic difference between the signals produced by muons (or protons) and the signals produced by electrons/photons
  - Possible solution: introduce some constant factor, based on beam test data