

# cdfSim Validation Update

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Simulation Meeting

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# Humor

A hydrogen atom is running into a police station asking for help.  
"I'd like a beer," he says....

Hydrogen atom: Somebody just stole my  
The bartender promptly serves up a beer.

electron! or  
"How much will that be?" asks the neutron.

Policeman: Are you sure?  
"For you?" replies the bartender, "no charge."

Hydrogen atom: I'm positive.

# “Big Picture” Review

- ◆ Compare new releases of CDF software w/previous and/or reference releases
  - Make validation histograms comparing current & past performance of simulation
  - Validation code to be added to SimulationMods
- ◆ Detector sub-components validated
  - Calorimeter
  - Muon Systems
  - Silicon, COT
  - ~~■ Tracking~~

# Detector Validation Review

## ◆ Calorimeter

- Low energy  $\pi$ 's
  - ◆  $p=1, 2, 3, 4, 5$  GeV
  - ◆ Towers 3 & 9
    - Central & face scan
- High energy  $\pi$ 's
  - ◆  $p=10, 57, 150$  GeV
  - ◆ Towers 0-11
    - Central scan
- High energy  $e$ 's
  - ◆  $p=10, 50, 100$  GeV
  - ◆ Towers 0-11
    - Central scan

## ◆ Muon Systems

- Low  $p_T$  ( $=1.5-5$  GeV) & high  $p_T$  ( $=40$  GeV)  $\mu$ 's
  - ◆ CMU, CMP, CMUP, CMP

## ◆ Silicon, COT

- $p_T=15$  GeV  $\mu$ 's
  - ◆ Cluster length, charge for all Si layers
  - ◆ para., geo., phys. CDM
  - ◆ #hits/SL for all SL

MC generated w/FakeEv unless otherwise specified

# Today

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- ◆ Calorimeter
- ◆ Muon Systems
- ◆ Silicon, COT

# Silicon, COT

## ◆ Cluster length & charge

- L00, SVX, ISL layers
  - ◆ Axial, 90°Z, SAS
    - Parametric, geometric, & physical CDMs

## ◆ #COT hits

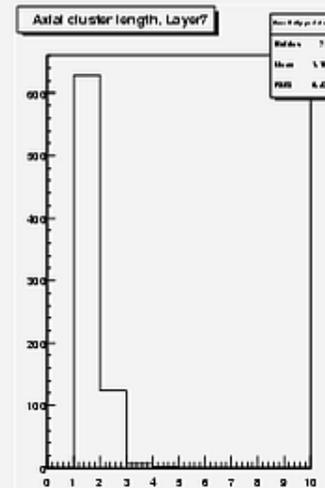
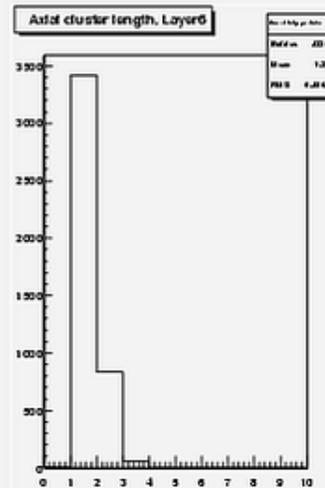
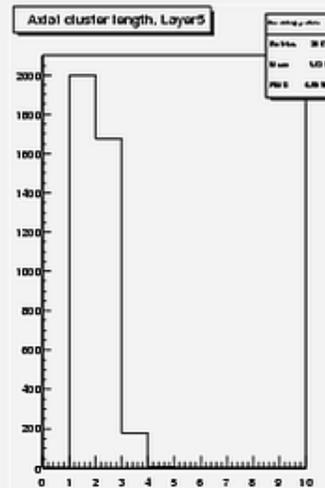
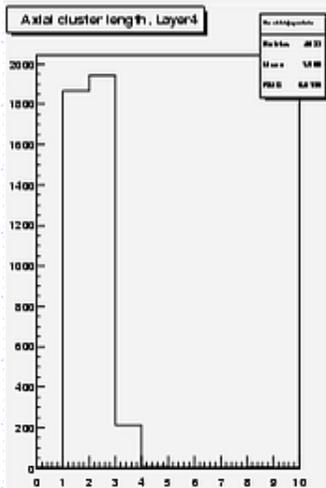
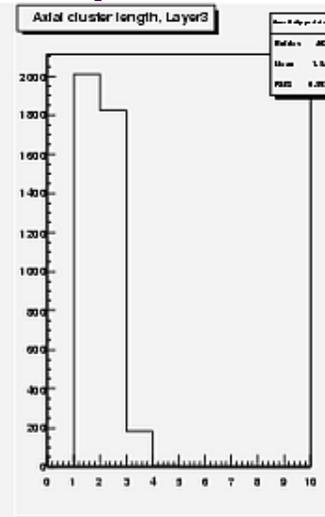
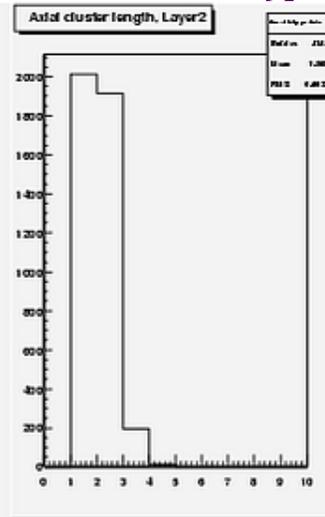
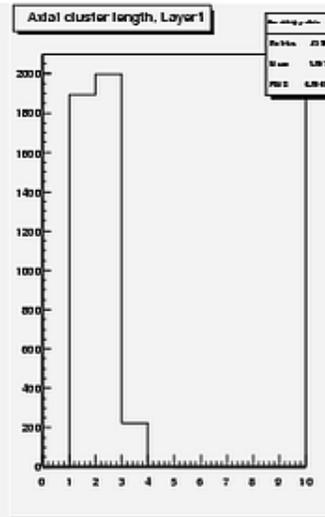
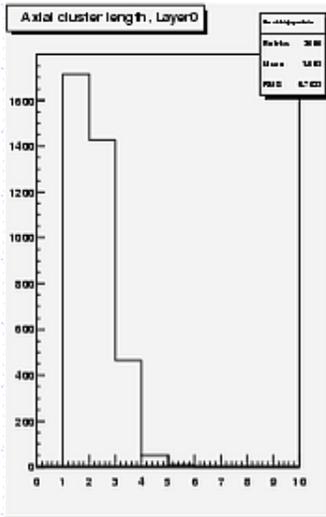
- Total, axial, stereo and per SL
- Hit width

## ◆ Residuals

- Si true track vs. hit
  - ◆ PropagatedSiParticleColl
- COT hit vs. track displacement

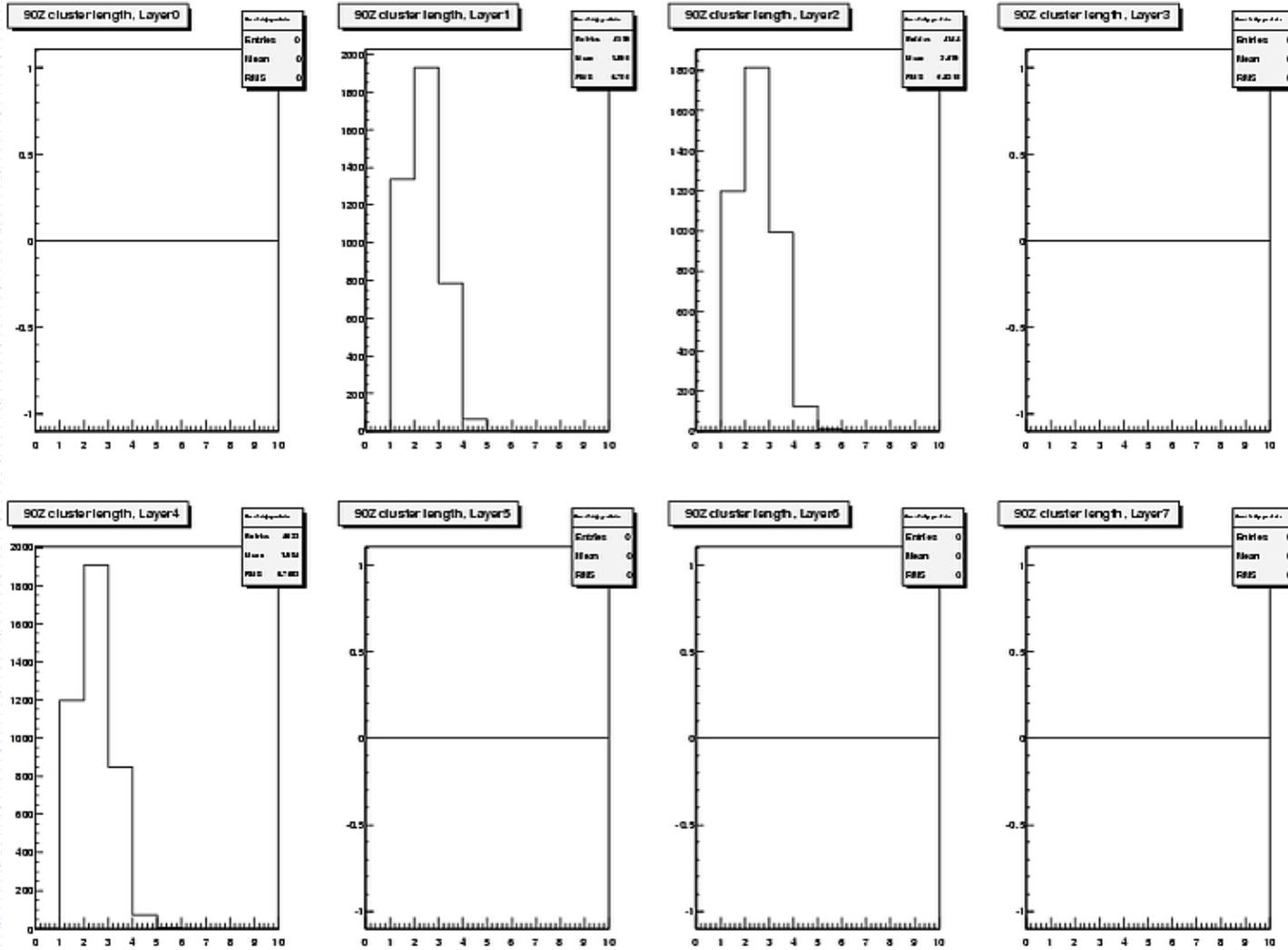
# Axial Cluster Length

## Geometric charge deposition model



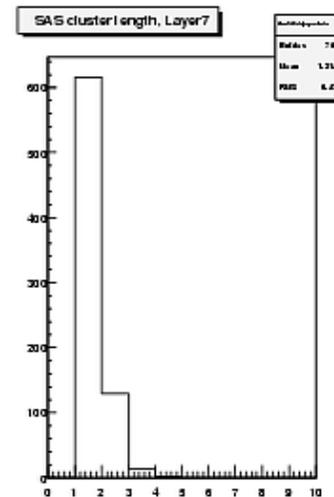
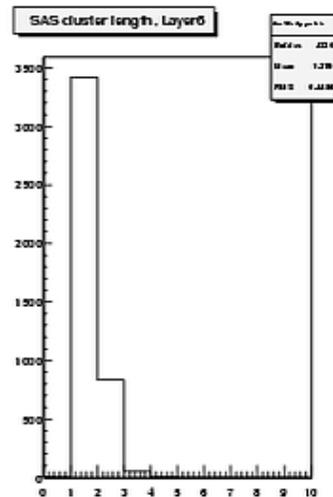
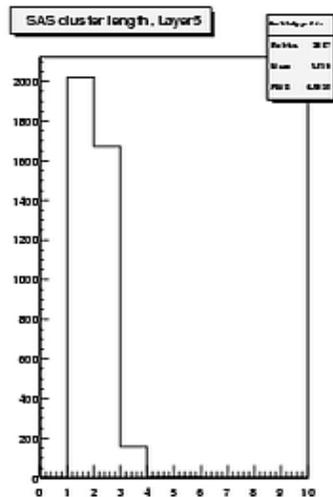
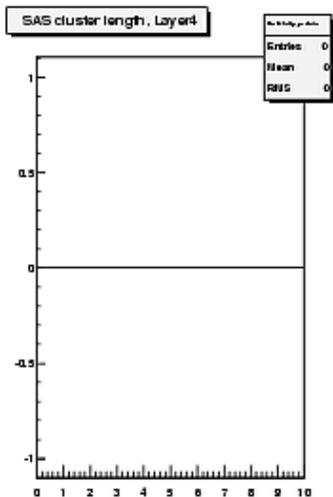
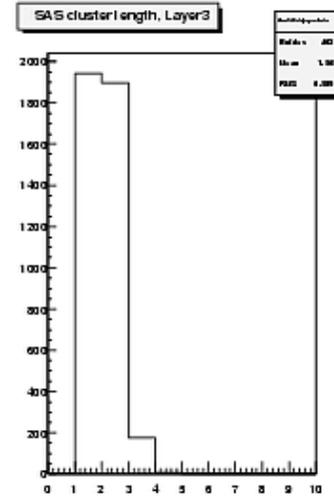
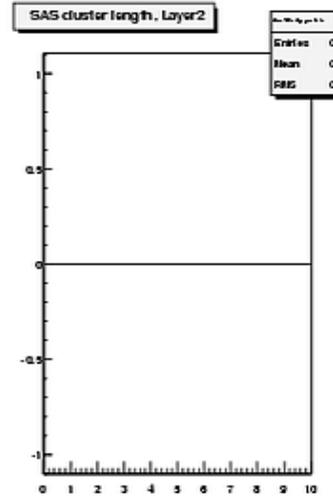
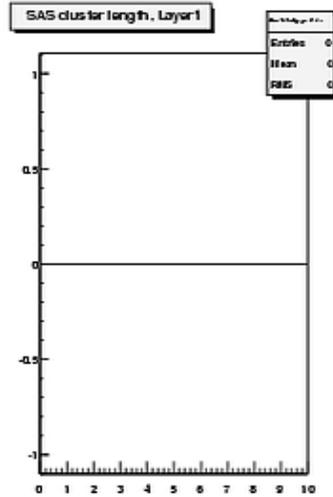
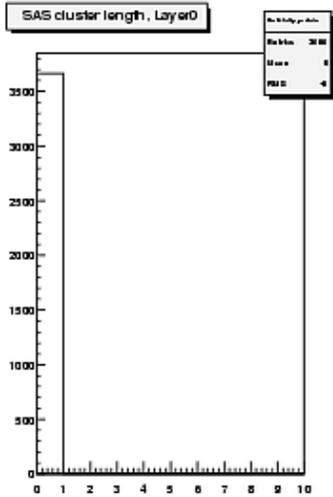
# 90° Z Cluster Length

## Geometric charge deposition model



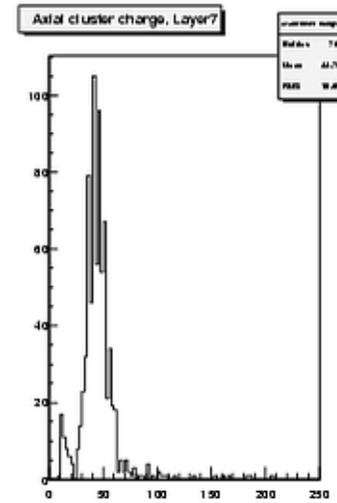
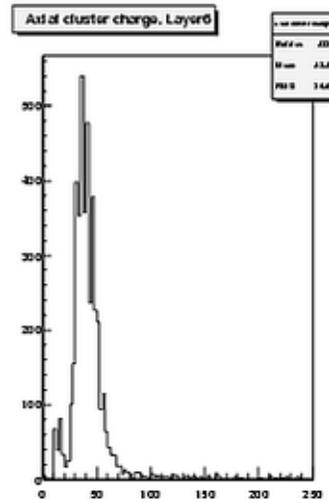
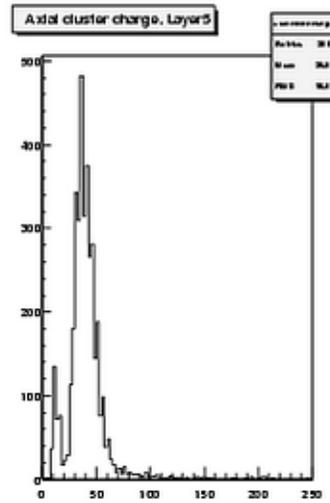
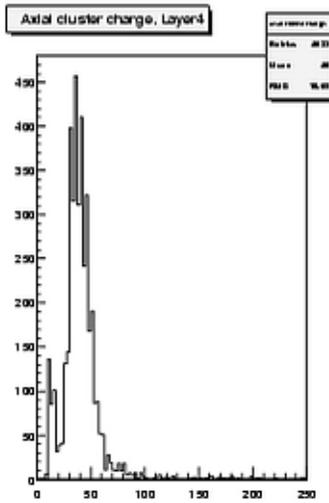
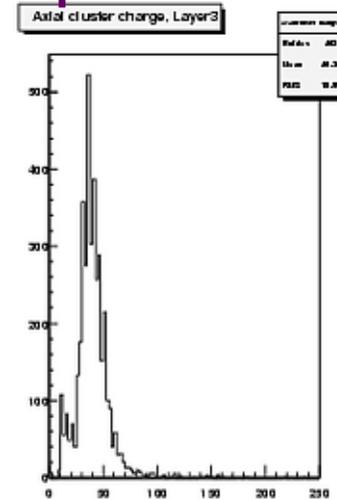
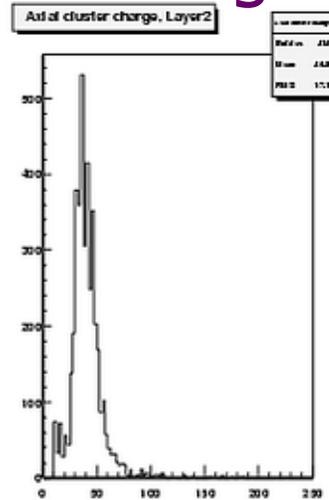
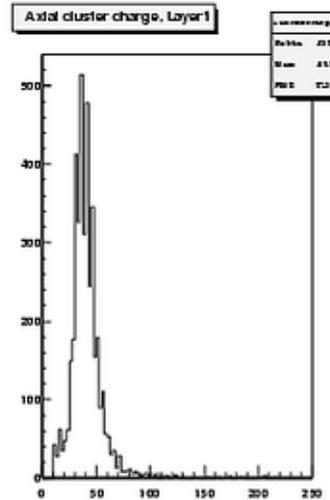
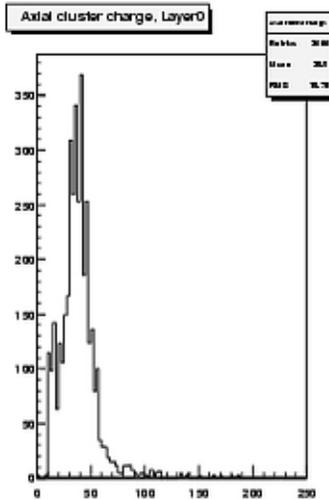
# SAS Cluster Length

## Geometric charge deposition model



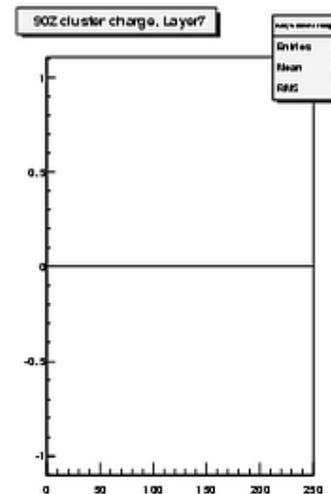
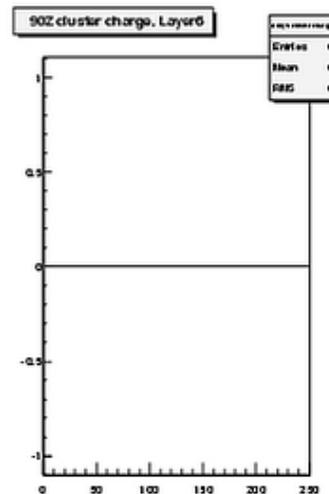
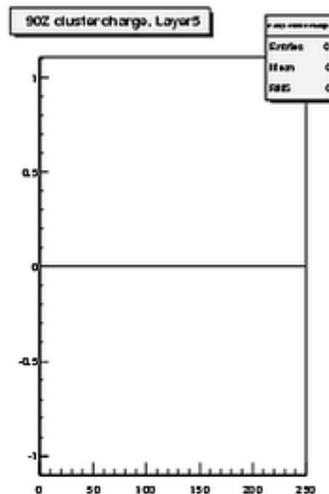
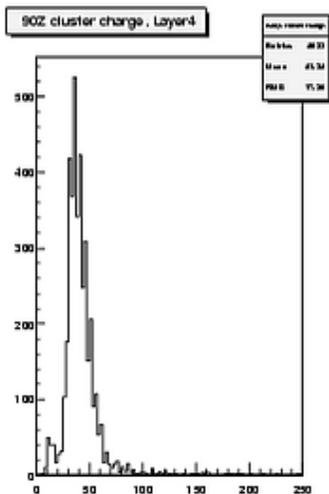
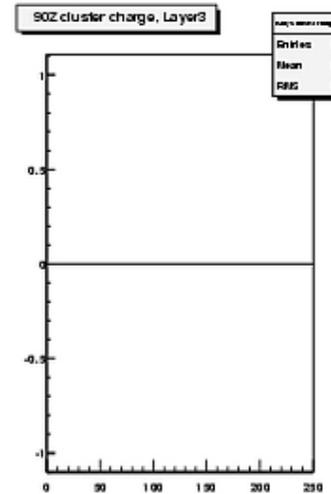
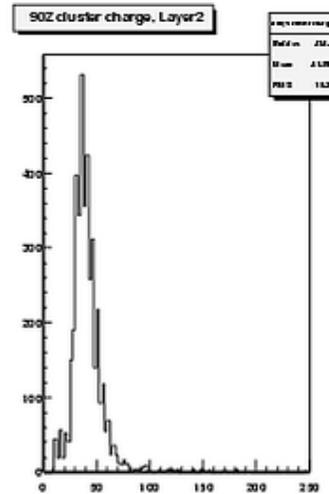
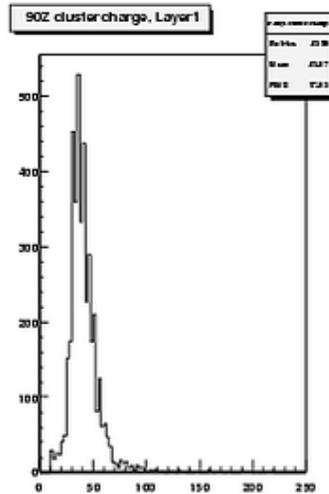
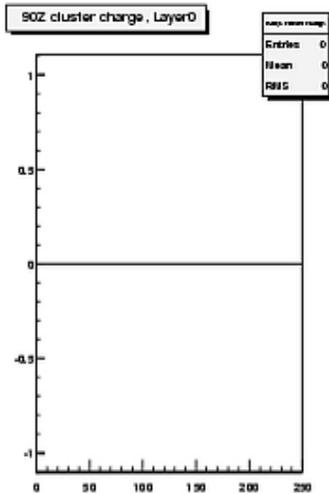
# Axial Cluster Charge

## Geometric charge deposition model



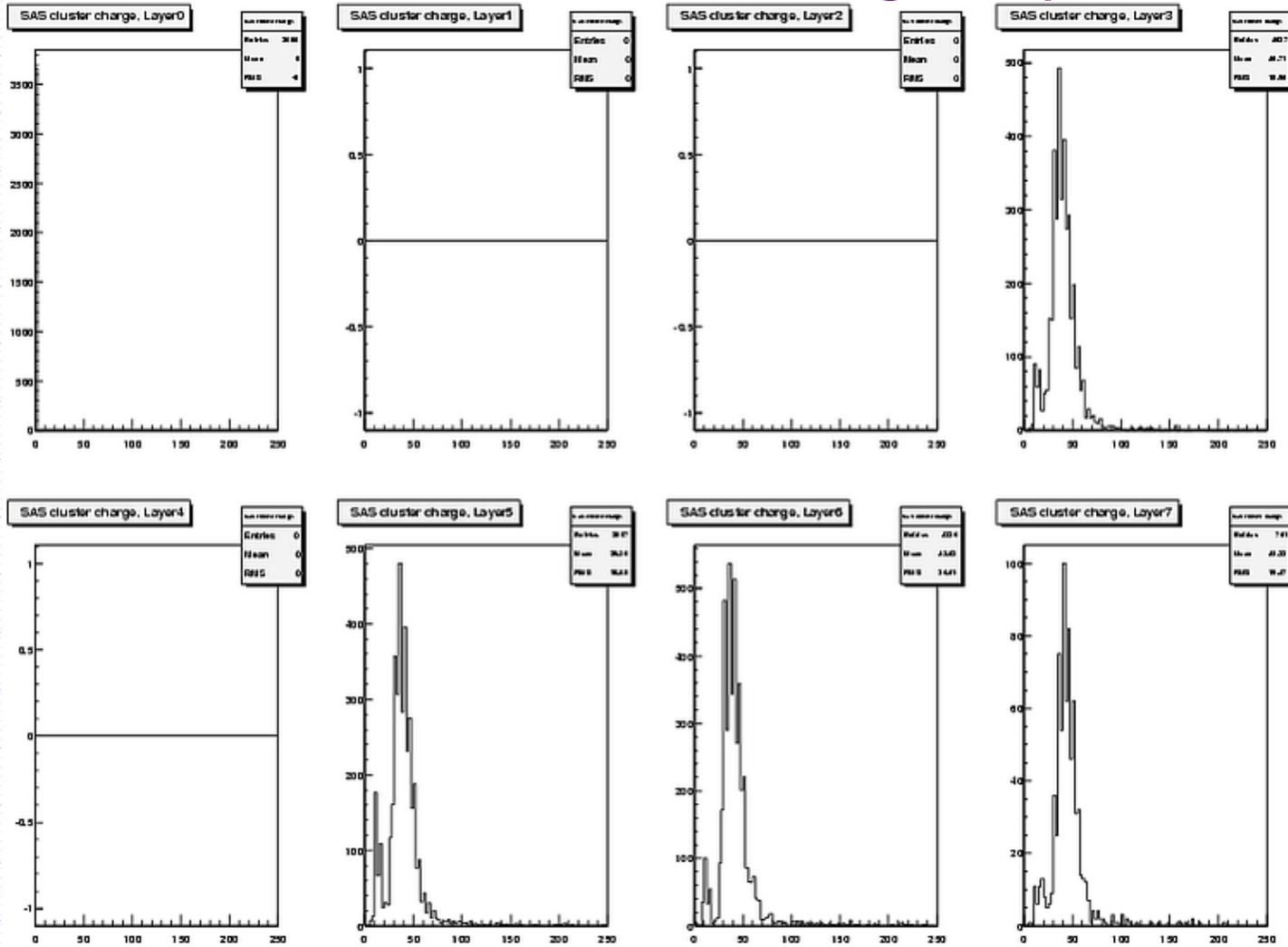
# 90° Z Cluster Charge

## Geometric charge deposition model



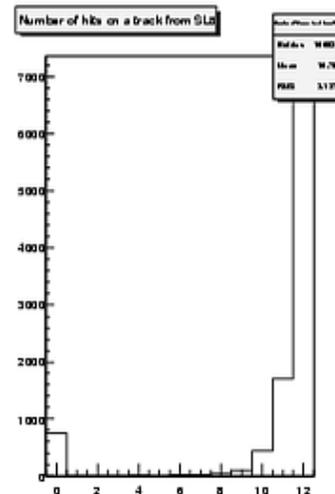
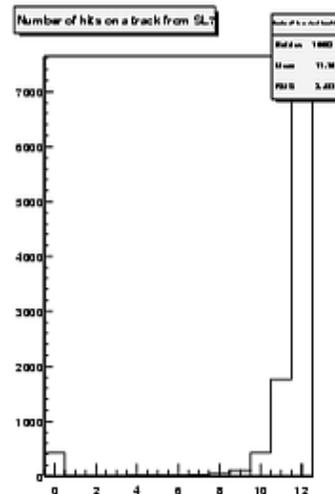
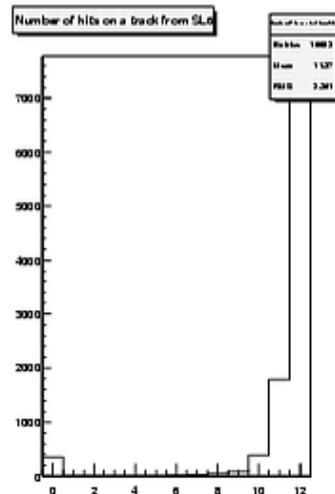
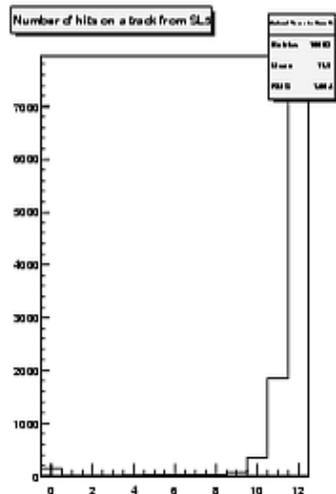
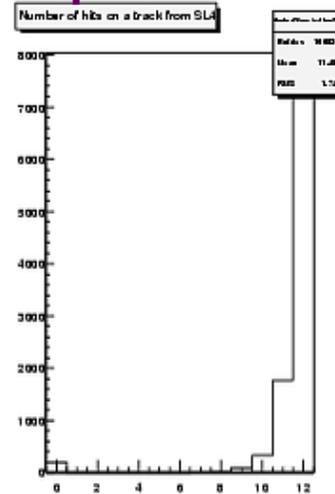
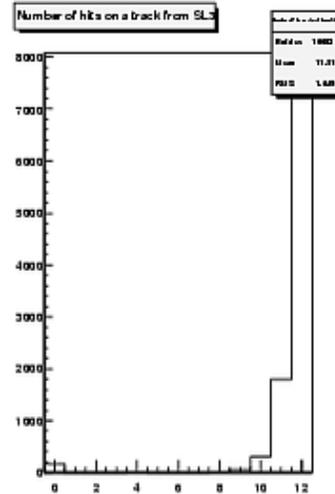
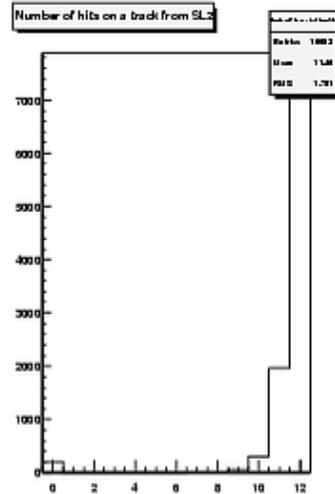
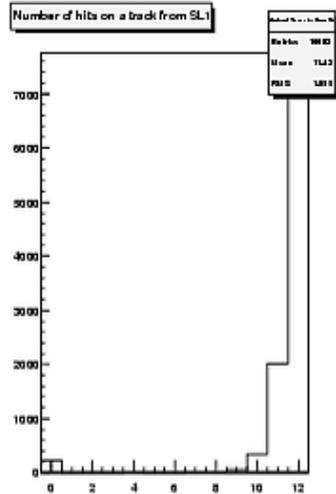
# SAS Cluster Charge

## Geometric charge deposition model



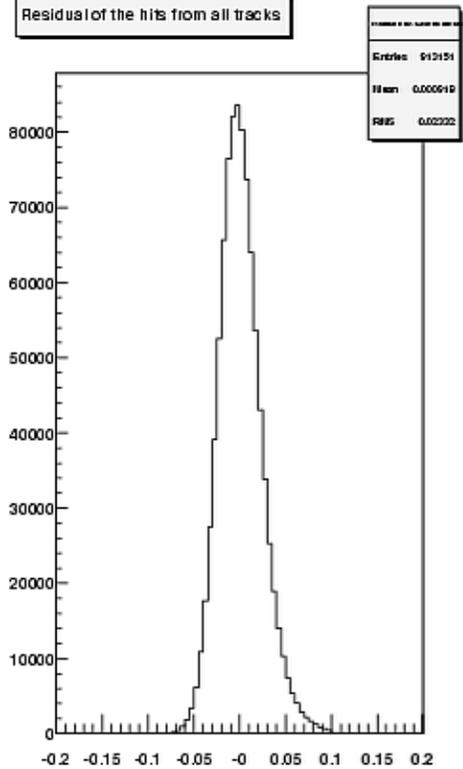
# COT Hits per SL

## Total #hits per SL

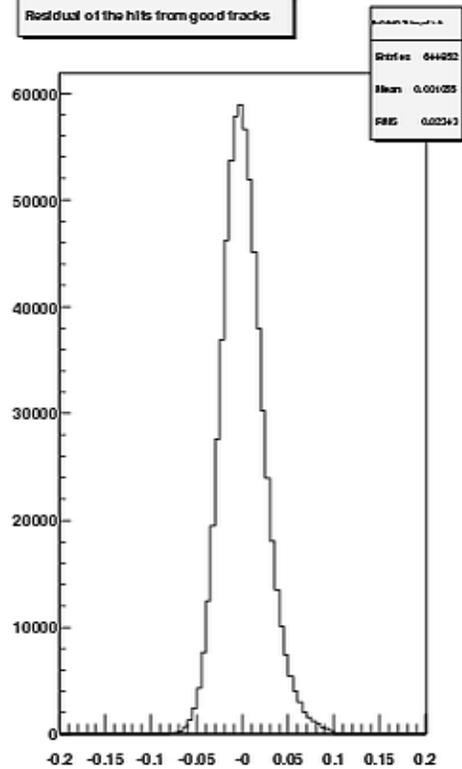


# COT Residuals

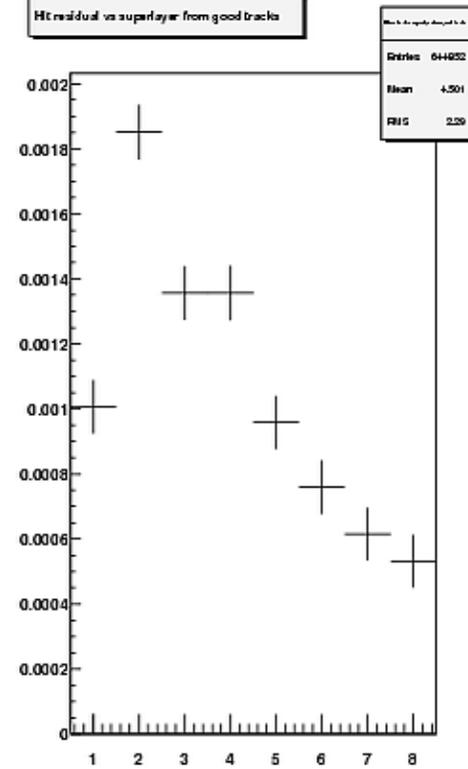
Residual of the hits from all tracks



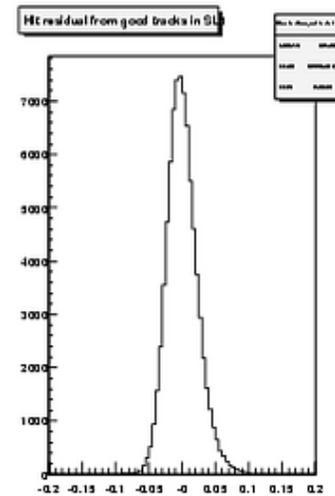
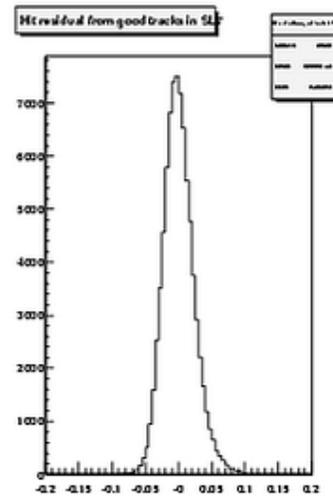
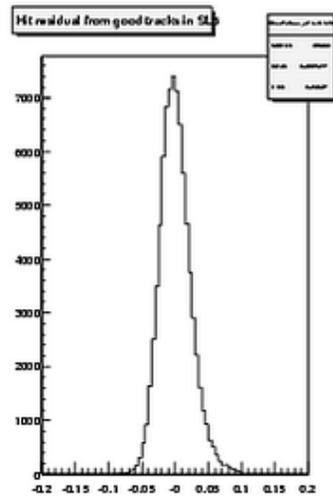
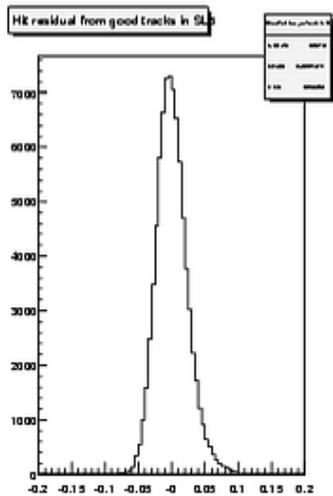
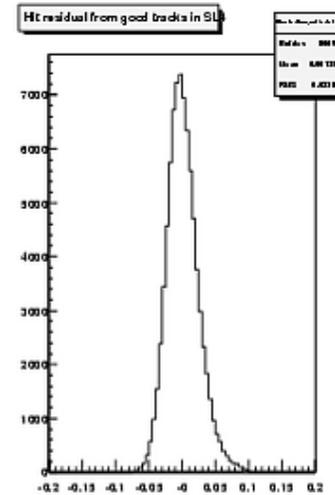
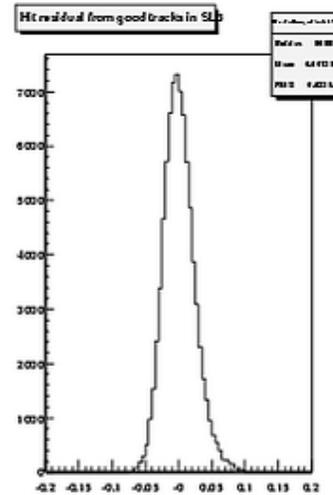
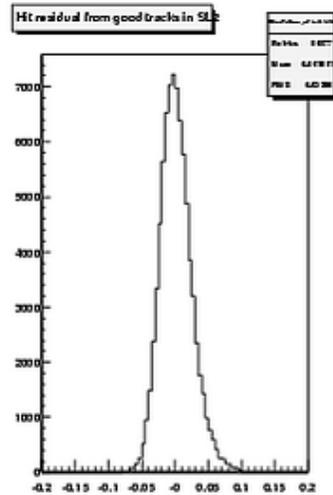
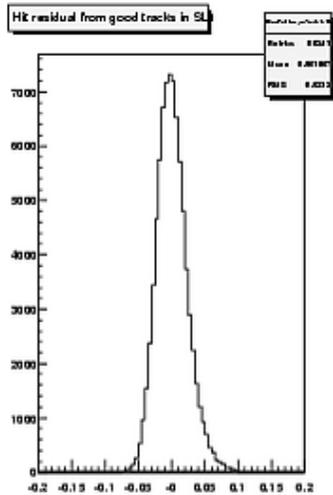
Residual of the hits from good tracks



Hit residual vs superlayer from good tracks



# COT Residuals per SL



# Summary

## ◆ Validation

### ■ Calorimeter

- ◆ Tower scan 0-11
- ◆ Face scan 3 & 9

### ■ Muon detectors

- ◆ Low & high  $p_T$   $\mu$ 's

### ■ COT

- ◆ superlayer scan
  - All & "good" tracks

### ■ Silicon

- ◆ Layers 0-7
- ◆ CDMs

Physics is becoming so unbelievably complex that it is taking longer and longer to train a physicist. *It is taking so long, in fact, to train a physicist* to the place where he understands the nature of physical problems that *he is already too old* to solve them. -- Eugene Wigner