

Status Report of Trigger and Latching(Hit) Efficiencies Study(4)

-- Comparison with MC Prediction for 6 tower data--

Instrument Analysis Workshop, July 15th, 2005

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Idea of the study

trigger primitive

latch of a hit

- Measure and monitor local/overall “trigger/latching(Hit)” efficiencies including Si gap, dead strip, insensitive area, alignment, timing, etc.
 - Use muons of known position and direction
 - > **detailed study**
 - Minimum event selection criteria
 - > **least (or no) bias**
 - Compare data with MC prediction
 - > **validate Gleam as well as LAT**
 - Use muon telescope (independent trigger)
 - > **measure absolute efficiency**

Test Configuration

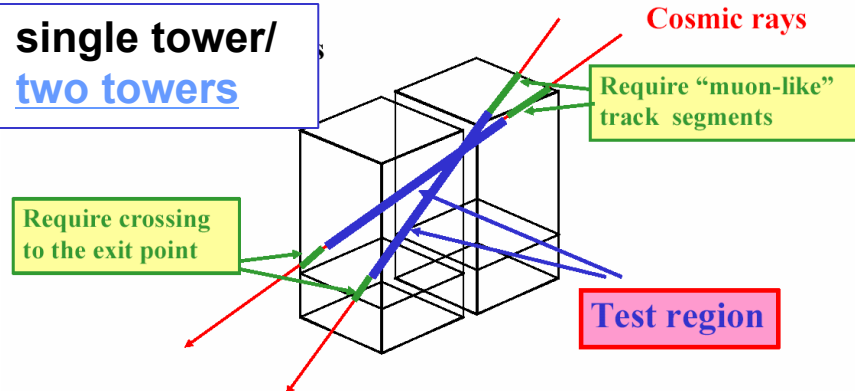
Objective:

Measure and monitor local/overall “trigger/latching(Hit)” efficiencies (including Si gap, dead strip, insensitive area, alignment, timing, etc.)

“Method 1”: without muon telescope

- Select muon-like events with TKR (keep bias as small as possible; use only 3 top layers and the bottommost one)
- Test intermediate layers
- Comparison with Gleam simulation (direction/position measured by TKR)

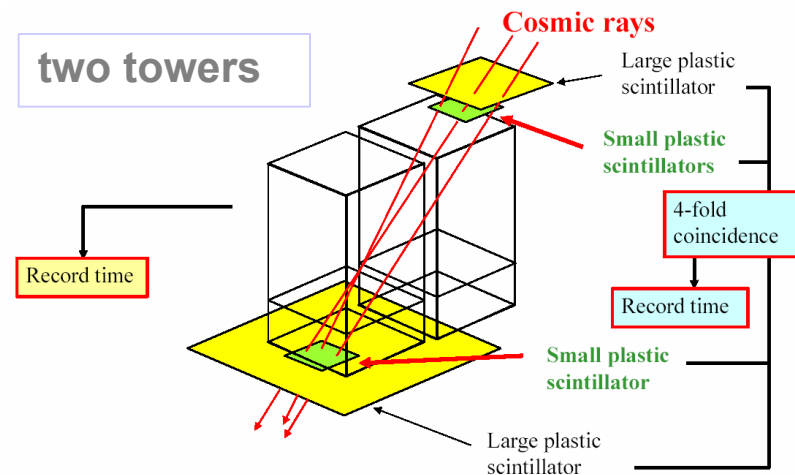
single tower/
two towers



“Method 2”: with muon telescope

- Select muon-like events with muon telescope (plastic scintillators)
- Unbiased overall efficiency study
- Comparison with Gleam simulation (require muons to cross plastic scintillators)

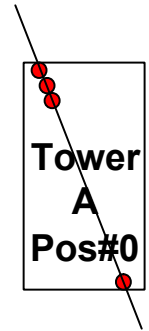
two towers



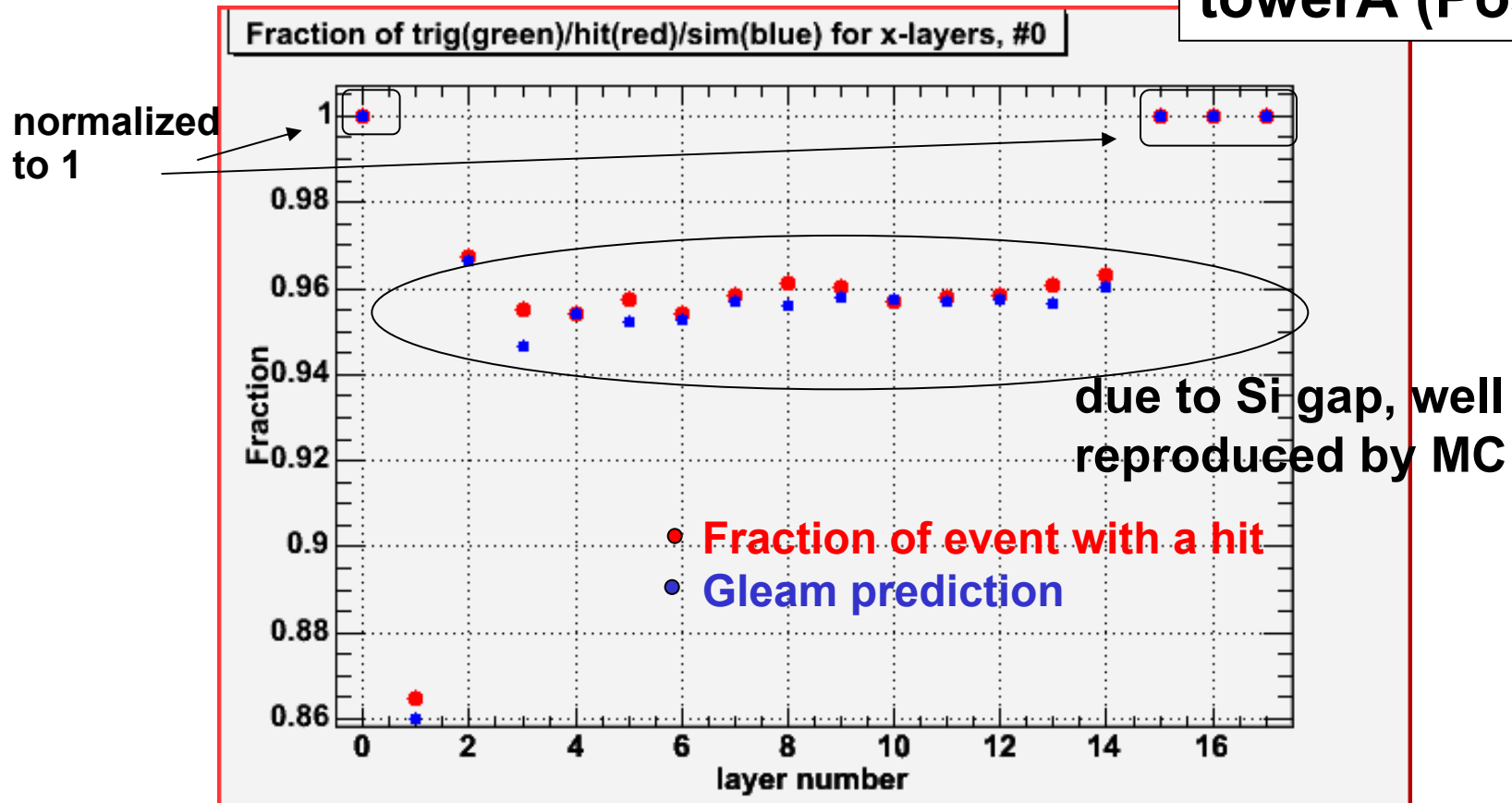
Here we show “Method 1” for 6 towers data with events passing through 1 tower or 2 towers. Analysis of muon telescope data (“Methods 2”) is underway.

Event crossing only one tower (1)

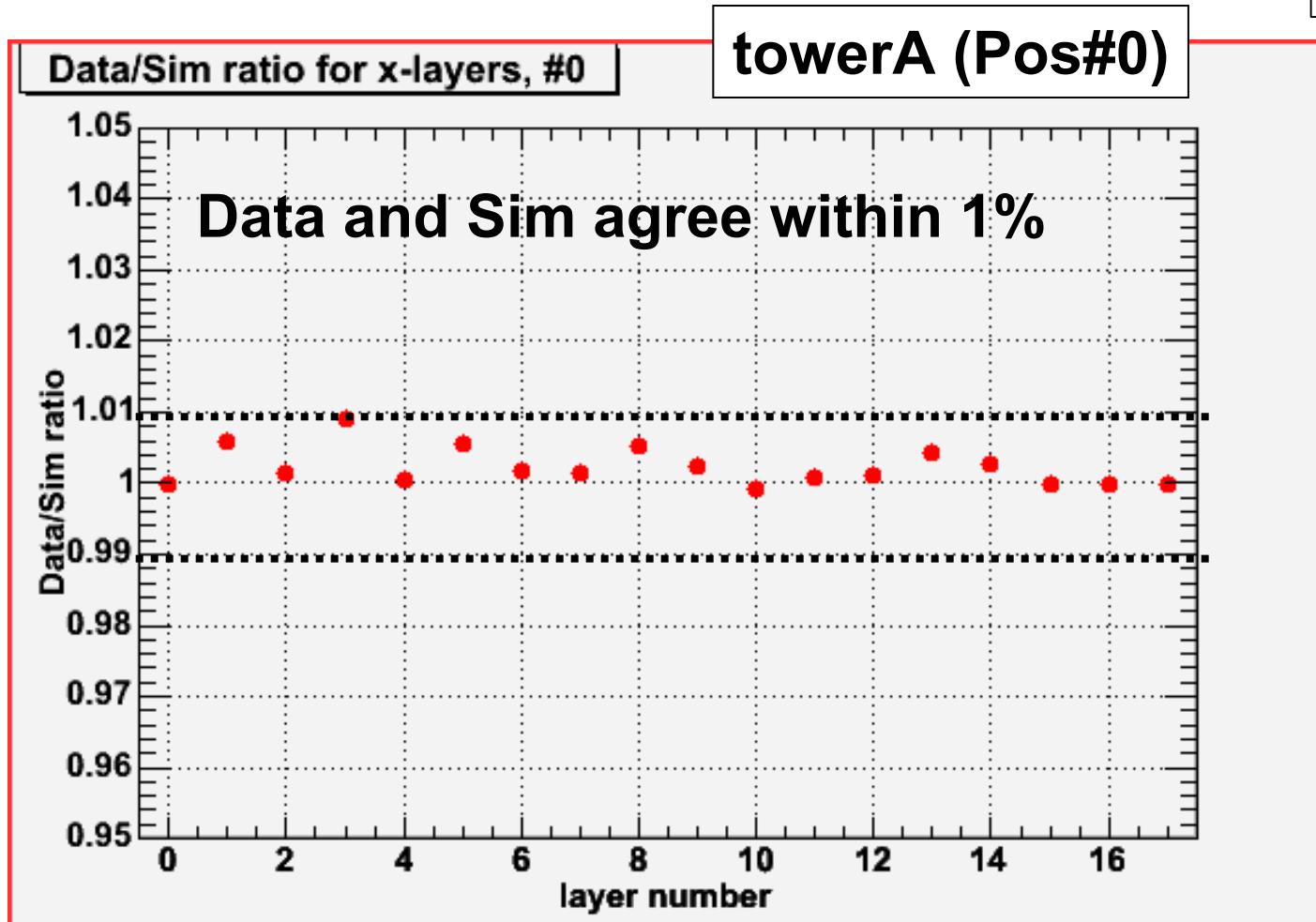
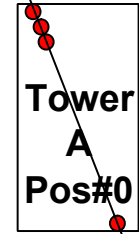
- Run id: 135003739-3753 (SVAC B2 run). Use EM-v5r0608p1 for MC.
- Select μ -like events that pass from **top of Tower A** to the **bottom of Tower A**
- Study local efficiency of intermediate planes.**
- Michael Kuss's intra-tower alignment was taken into account.
- Know issue of trigger primitive – concentrate on Hit efficiency



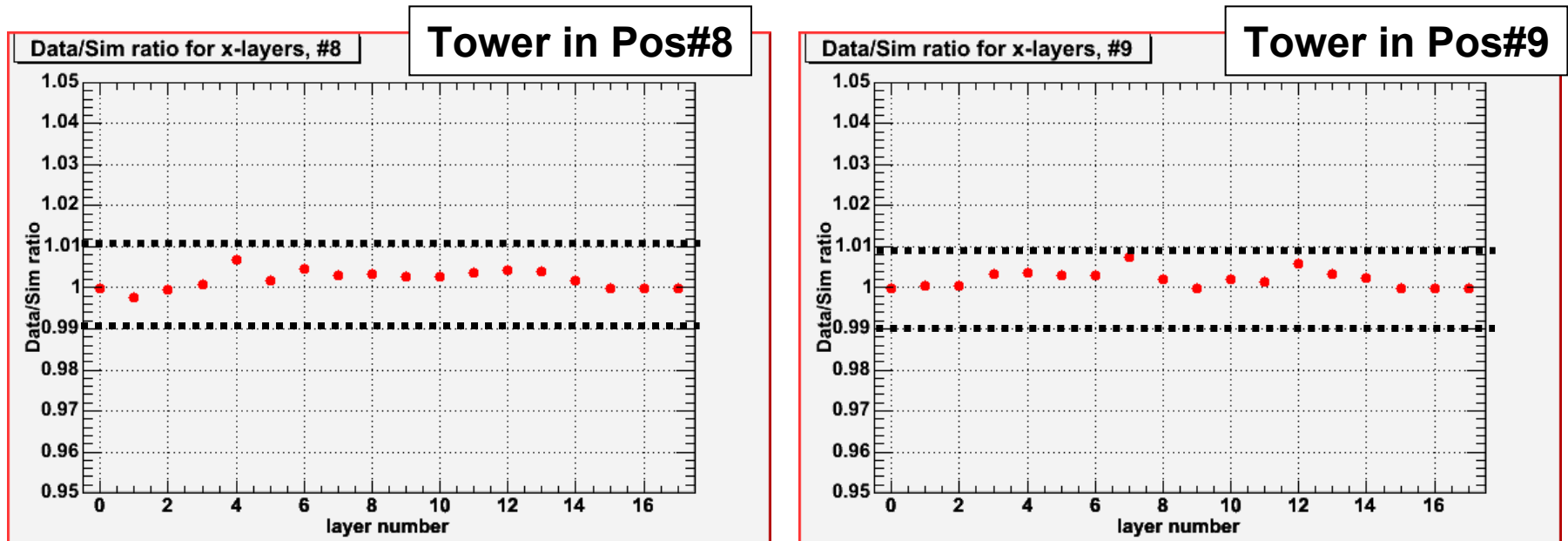
towerA (Pos#0)



Event crossing only one tower (2)



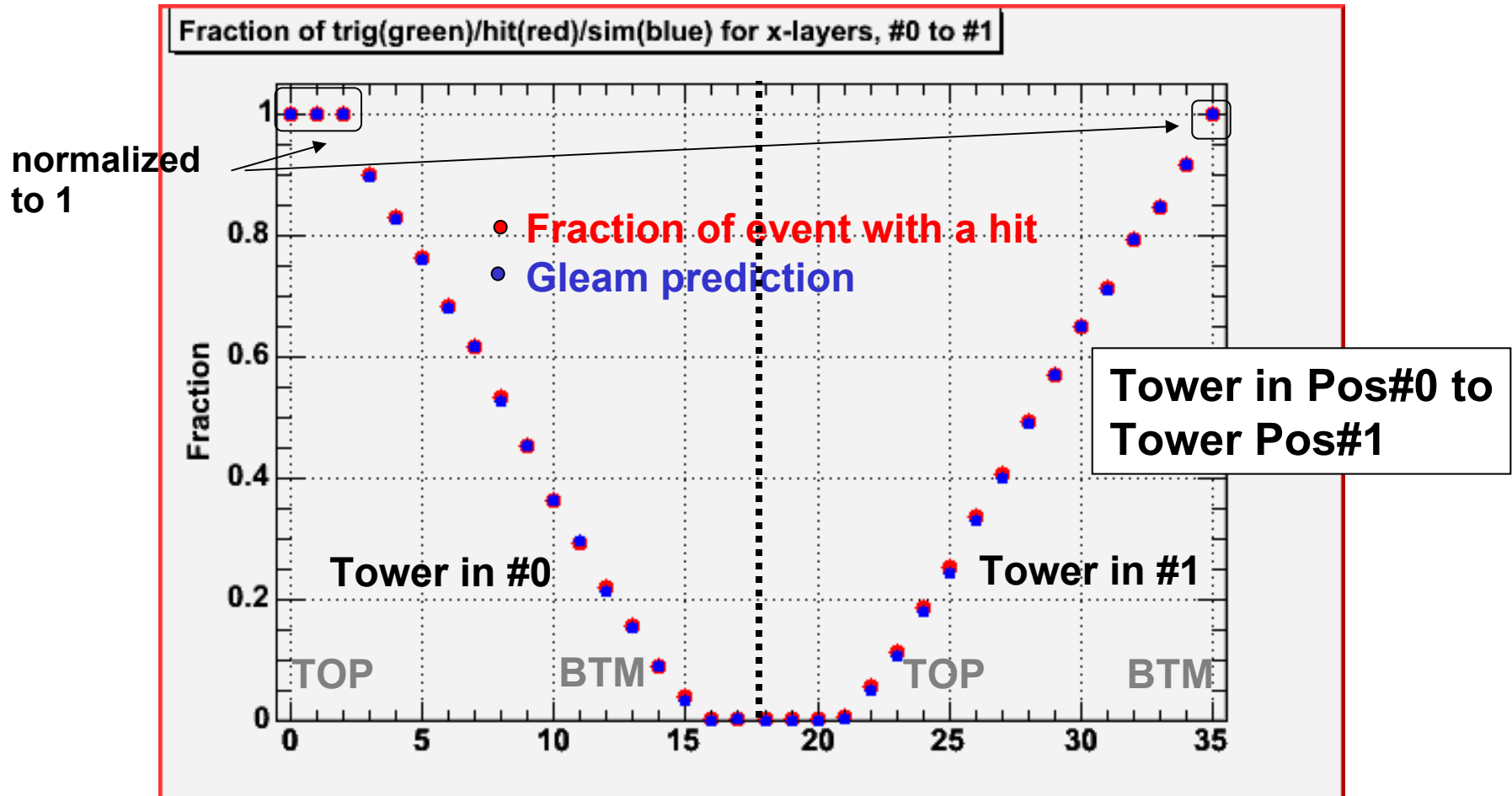
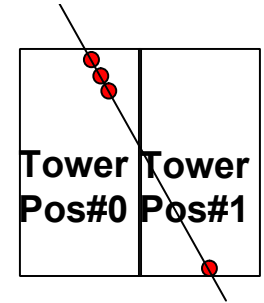
Event crossing only one tower (3)



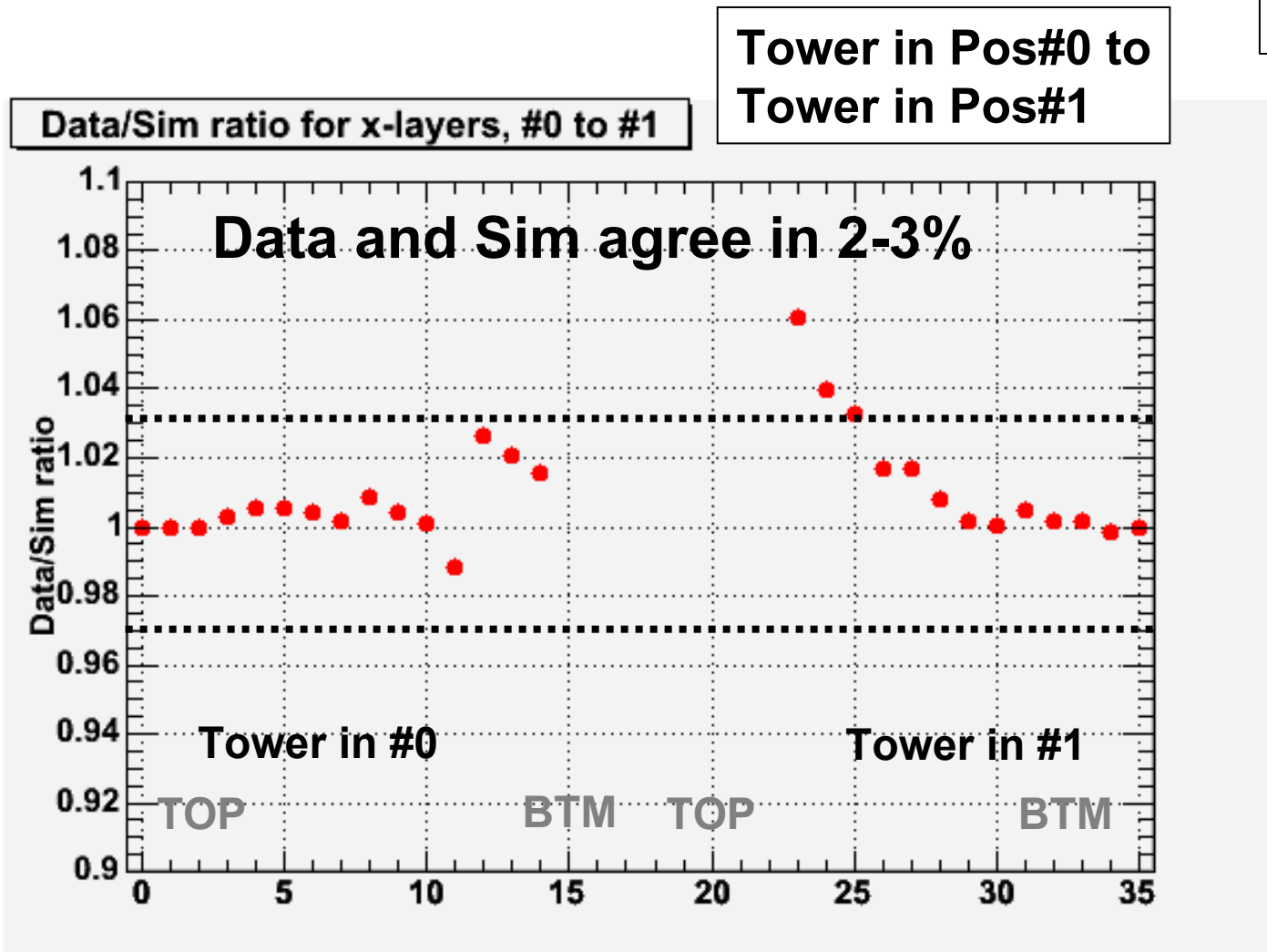
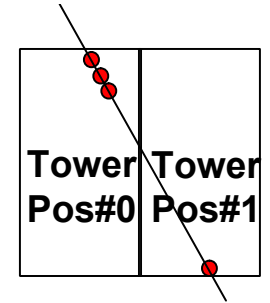
- **Good agreement within 1% for all 6 towers** (except planes with partial dead strips).
- Data is slightly ($\sim 0.5\%$) over-efficient (or vice versa). We will examine this.

Event crossing two towers (1)

- Run id: 135003739-3753 (SVAC B2 run). Use EM-v5r0608p1 for MC.
- Select μ -like events that pass from **top of Tower in #0** to the **bottom of Tower in #1**
- Study efficiency of intermediate planes.** (Any interference between towers?)

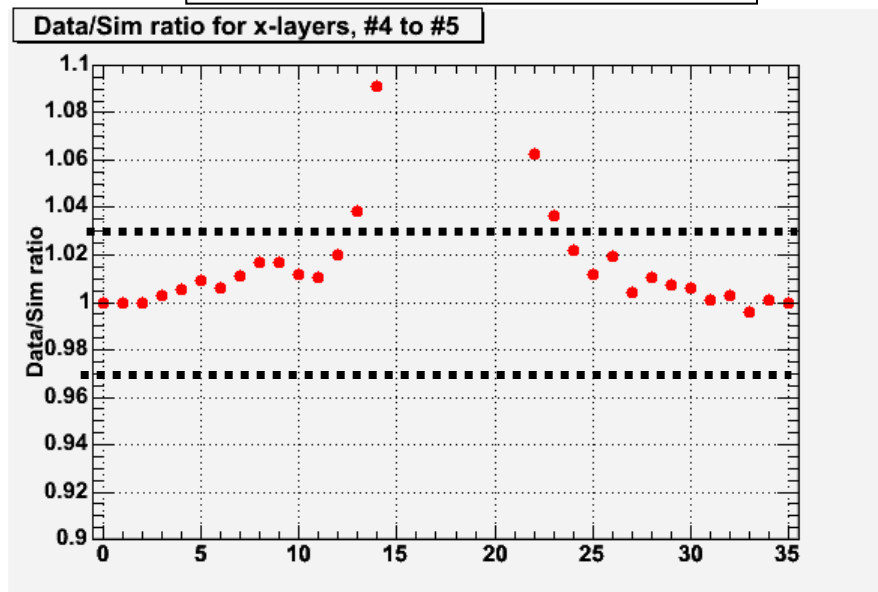


Event crossing two towers (2)

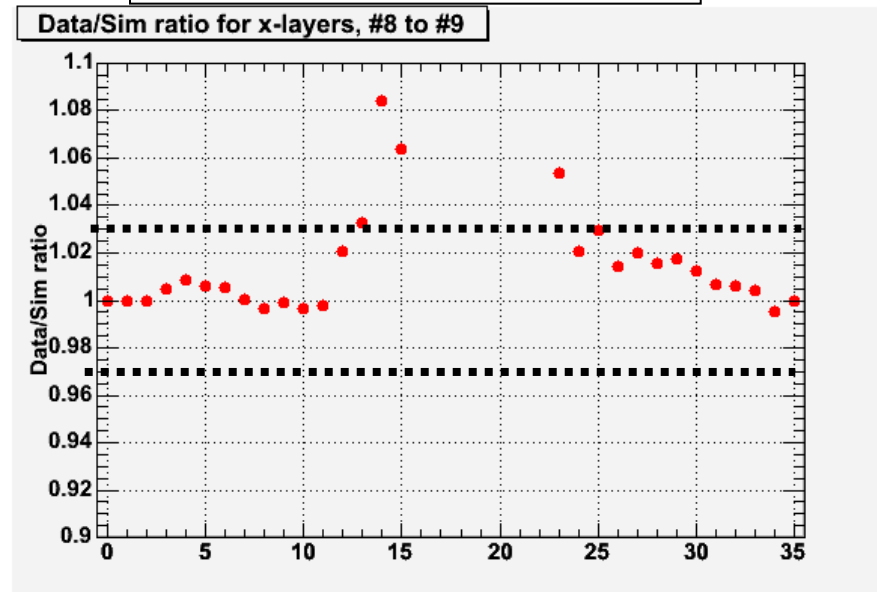


Event crossing two towers (3)

Tower in Pos#4 to #5



Tower in Pos#8 to #9



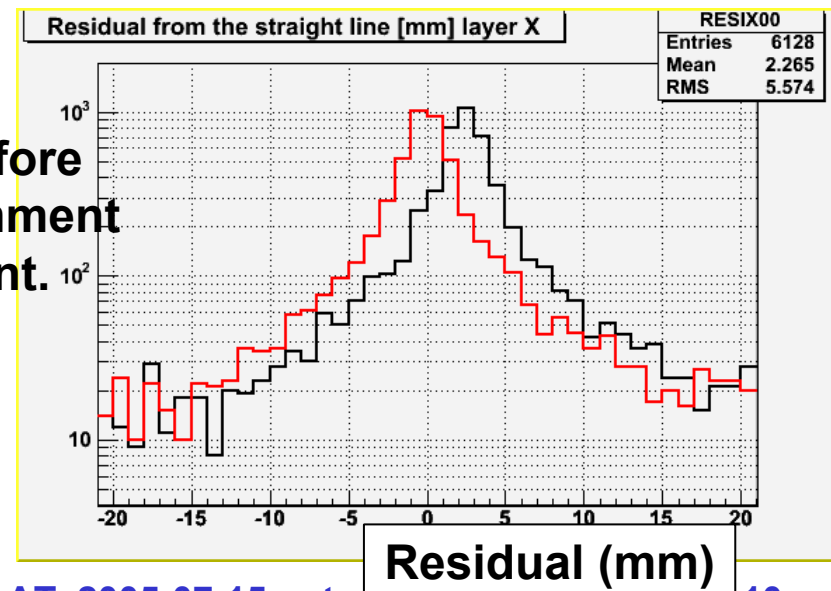
- Reasonable agreement in 2-3% for all 7 combination of 2 towers (except planes with partial dead strips).
- Data is somewhat (1-2%) over-efficient (or vice versa). We will examine this.

Acknowledgement

Special thanks to

- Gary Godfrey (muon telescope preparation/data taking)
- James Chiang (FileSource class implementation)
- Toby Burnett (surface muon generator)
- Leon Rochester and Anderson Borgland (valuable instructions in Glead simulation)
- Michael Kuss (intra-tower alignment)
- And all others! (extensive work of hardware/software)

Residual from the straight line, before (black) and **after (red)** Kuss's alignment parameters were taken into account.



Summary and Future Plan

- We have checked latching (Hit) efficiency of each plane for 6 towers, by using muon events and comparison with MC simulation. (Distribution of directions/positions of MC muons are adjusted to the measured ones.)
- **Good agreement between Gleam and real data** for the events passing through one tower/two towers in “Method 1”. -> LAT and Gleam were validated each other in 2-3% level.
- Data is somewhat over efficient (or vice versa). Need further study.
- Will work on inter-tower alignment and take it into account.
- **Muon telescope data analysis (“Method 2”) is underway** in order to measure absolute trigger efficiency.

Backup Slide (1): 6 tower configuration

12	13	14	15
8	9	10	11
4	5	6	7
0	1	2	3

6 Towers

Backup Slide (2): example of plane with partial dead strips

