
My recent work
A brief introduction to HCAL

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Outline

- Hits and Energy deposit of HCAL:
 - Hits of 1000 π^+
 - Energy deposit of single π^+
- Comparison of information from each sub-detectors
 - Energy output in Tracker, ECAL, and HCAL
 - Eta & Phi information
- Summary and Next to do

Hits of Sample 1000 π^+ in Calotowers

ID					
entries					500~
	1375740672 0	1375740800 0	1375740928 0		200~500
	1375740673 169	1375740801 812	1375740929 17		~200
	1375740674 11	1375740802 14	1375740930 0		
	1375740675 1	1375740803 3	1375740931 0		

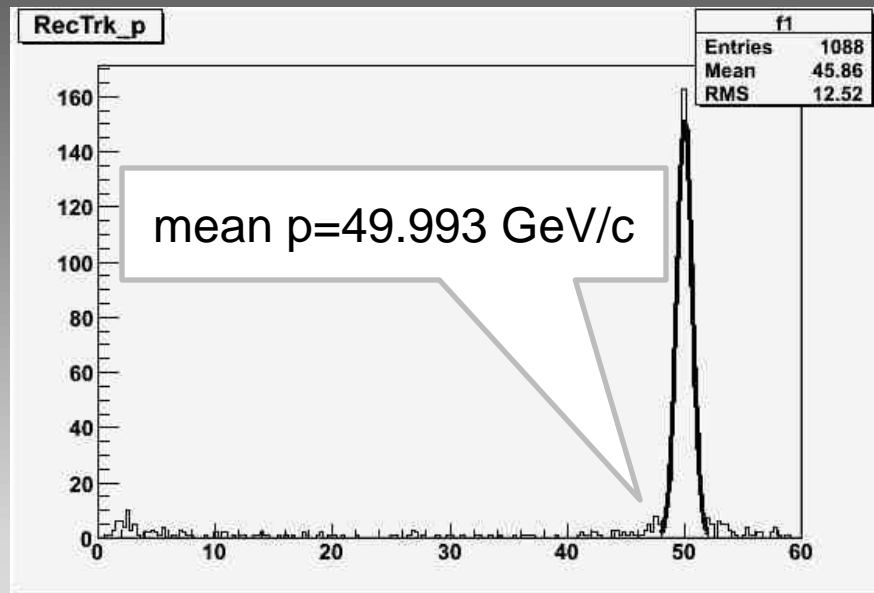
Energy deposit of Single π^+ in Calotowers

ID					
entries					500~
	1375740672 0	1375740800 0	1375740928 0		200~500
1375740545 0	1375740673/169 33.9279	1375740801/812 0	1375740929 0		~200
	1375740674/11 3.88489	1375740802 4.16282	1375740930 0		
	1375740675 0	1375740803 0	1375740931 0		

Energy Deposit in Ecal

ID/entries Energy/Gev						0.5~ 0.3~0.5 0.1~0.3 ~0.1
838941191/16 0.3632	838941703/61 0.1309	838942215/211 0.2208	838942727/521 0.2445	838943239/430 0.1907	838943751/139 0.0870	
838941192/37 0.3877	838941704/95 0.1863	838942216/314 0.4901	838942728/592 0.8025	838943240/526 0.3894	838943752/315 0.1024	
838941193/61 0.1994	838941705/137 0.1170	838942217/233 1.1051	838942729/632 0.9756	838943241/499 0.7278	838943753/444 0.1363	838944265 277
838941194/39 0.2642	838941706/92 0.6255	838942218/390 1.0385	838942730/604 0.2146	838943242/526 0.5673	838943754/311 0.1648	838944266 128
838941195/27 0.3418	838941707/63 0.5216	838942219/311 0.4276	838942731/554 0.5666	838943243/448 0.3065	838943755/178 0.2441	838944267 53
838941196/14 0.0827	838941708/36 0.1682	838942220/176 0.2514	838942732/417 0.1651	838943244/280 0.1818	838943756 84	
S1 = 1.1051 S3 × 3 = 5.5552 S5 × 5 = 11.4052			S1 = 0.9756 S3 × 3 = 6.3109 S5 × 5 = 10.5835			

Comparison of E output in sub-detectors



1000 pi+ in Tracker

- HCAL 33.9279GeV + ECAL11.4052GeV = 45.3331GeV
- $45.3331\text{GeV} / 50\text{GeV} = 90.7 \%$

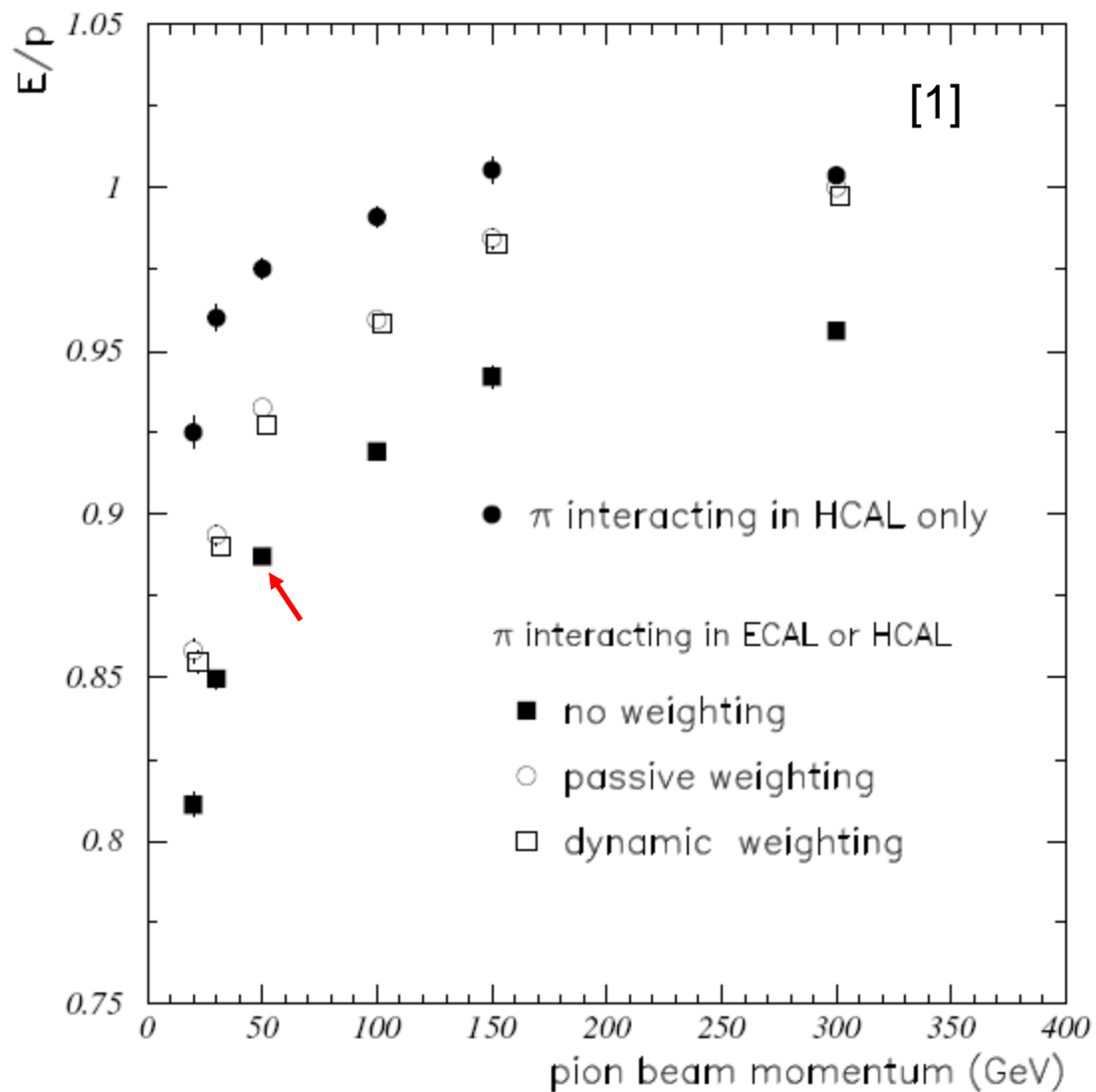
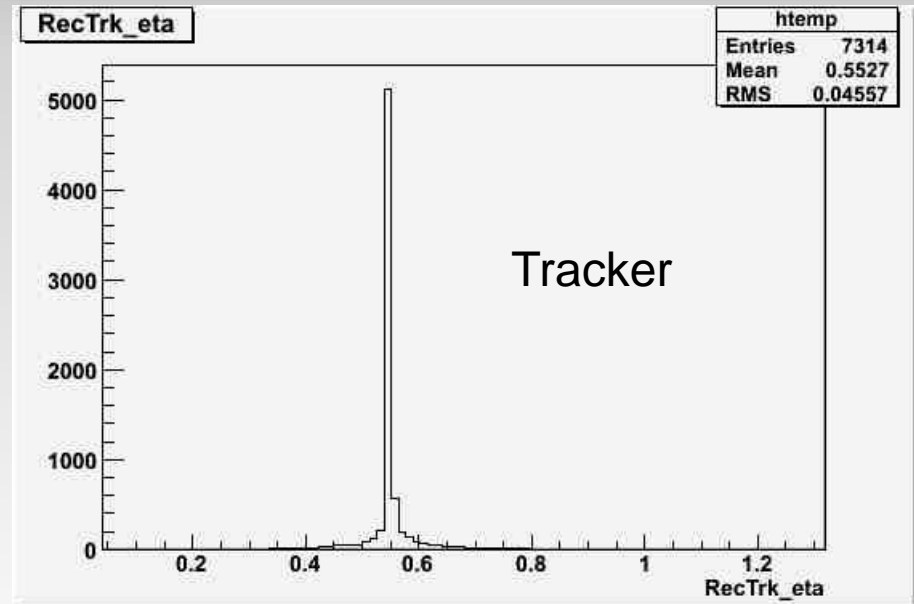
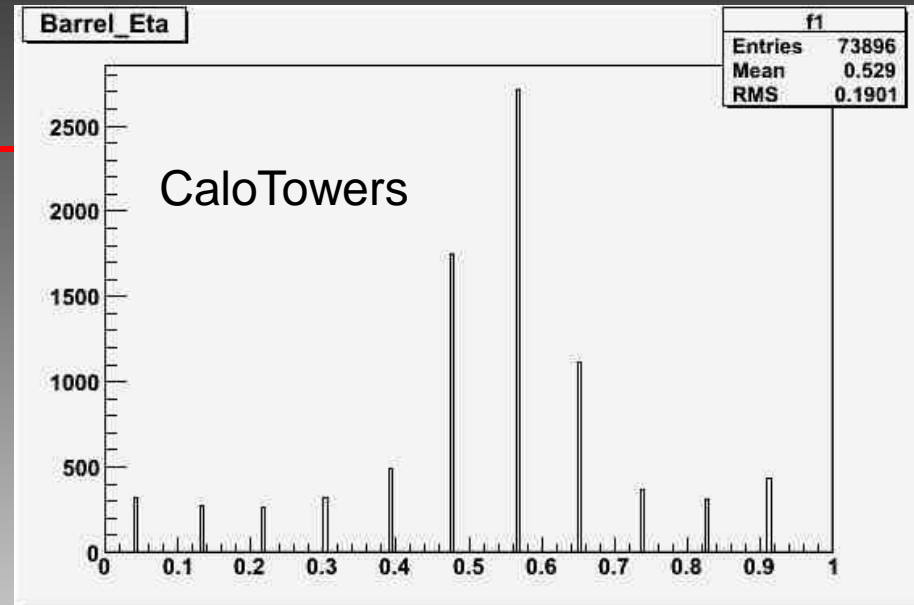
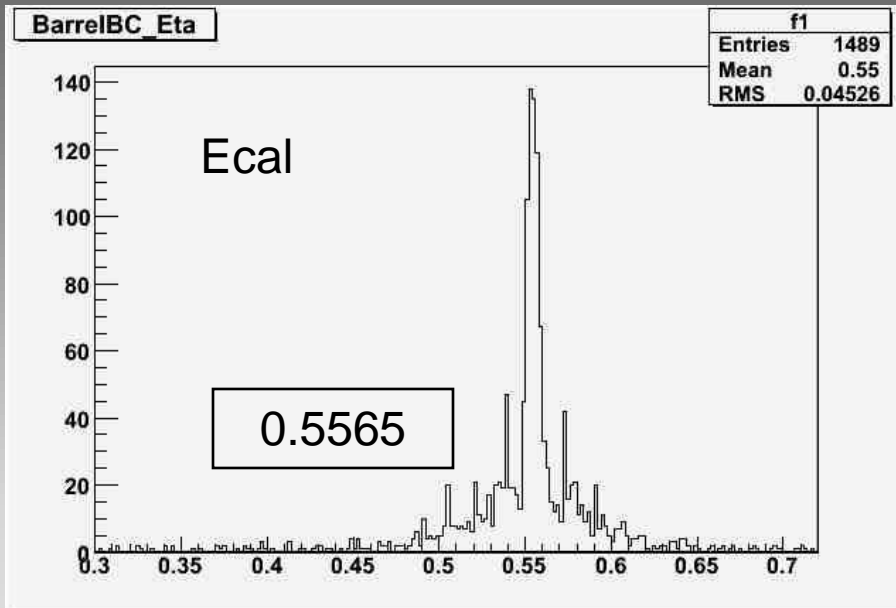


Figure 1: Linearity of HCAL and ECAL+HCAL response from the test beam data [6]

Eta comparison



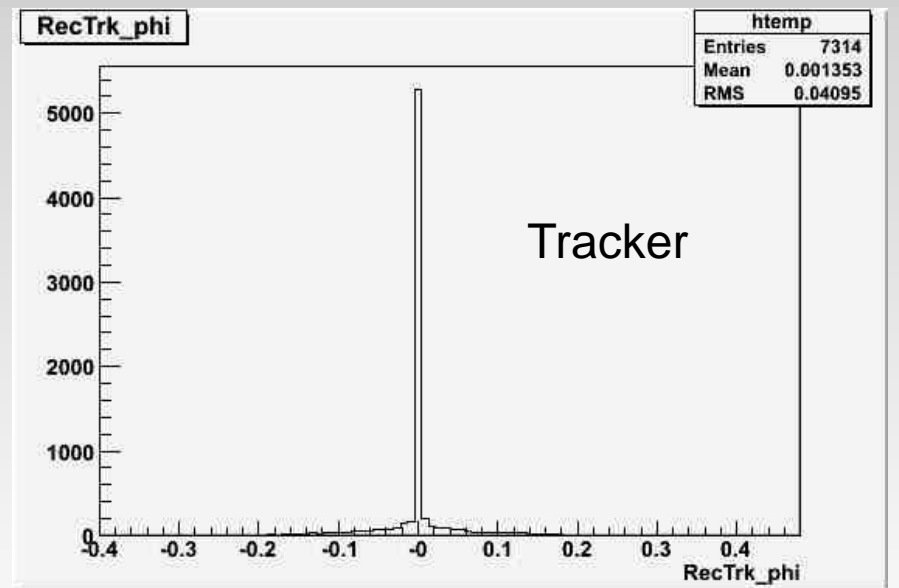
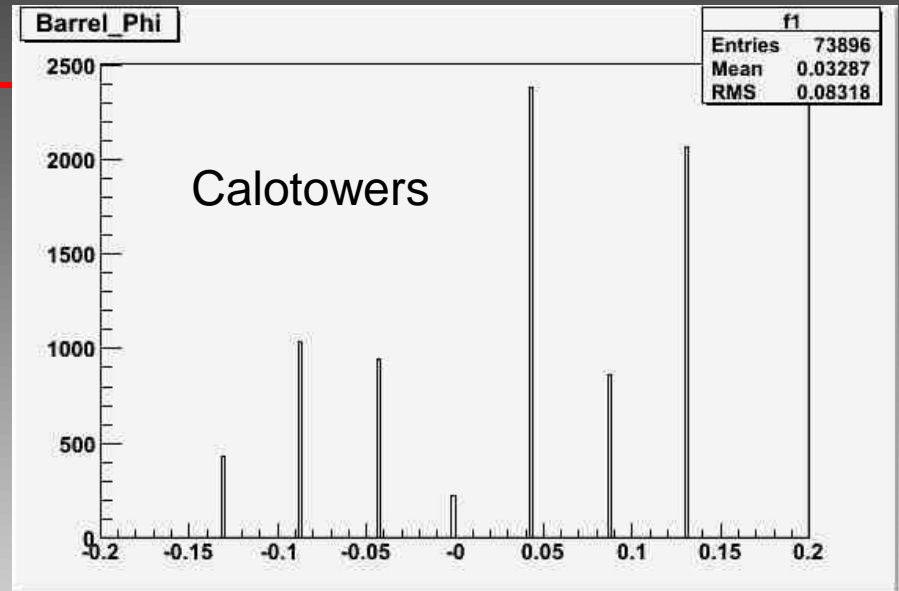
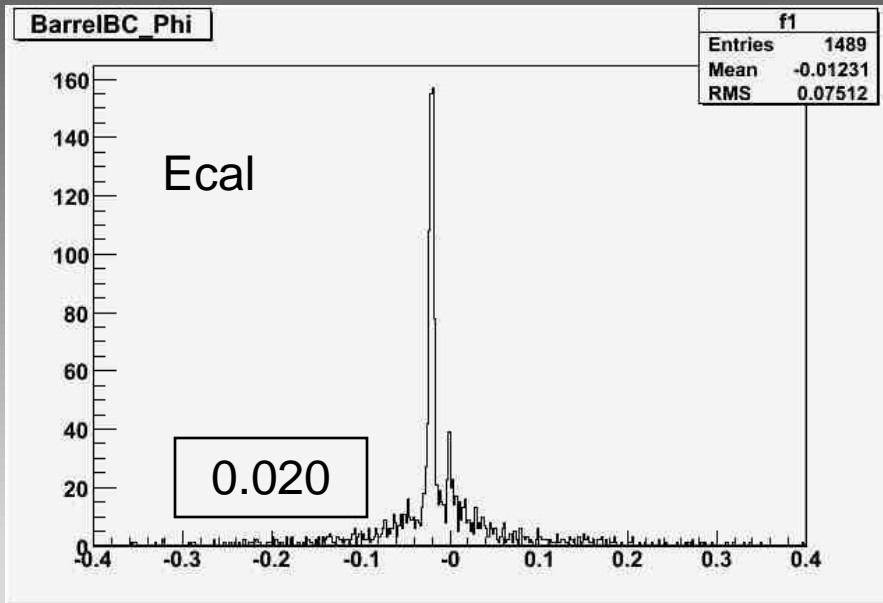
Generation level

E = 50 GeV

Eta = 0.551406

Phi = 0.0971266

Phi comparison



Pointing Hit test

E = 50 GeV

Eta = 0.551406

Phi = 0.0971266

Summary

- Calotower information
 - Energy deposit (Ecal+Hcal) is a good match to literature [1].
 - The Eta & Phi from each sub-detector matches each other well.

Next to do

- Energy deposit
 - To Simulation the energy deposit in each piece of Ecal crystal.

Reference

[1] Dan Green, Energy Flow in CMS Calorimeters, Fermilab-FN-704, July 2001.