Status of Low Energy Data and Homogeneity Study for SDHCAL

Bing Liu, Garillot Guillaume, Imad Laktineh, Haijun Yang



CALICE Collaboration Meeting Utrecht University, April 10-12, 2019



• The homogeneity study of SDHCAL

- Low energy beam data analysis
 - Event Selection
 - Energy resolution & linearity
- Conclusion

Test beam setup: **Standard** & **Uniform**

Standard: The all chips use the **same** three threshold

Uniform: In order to obtain more **uniform** performance of our prototype, use varied threshold for chips

2017: **48** layers prototype 2018: **37** layers prototype plus SiW-Ecal

2017 & 2018 Test beam





2017: 40GeV, two position (center and low-left) 80GeV, three position

2018:

50GeV, two position (center and top, Top and top right)

70GeV, three position

Multiplicity: How to.....



Basically, exposing the SDHCAL to the enough muon beams, get this curve by changing threshold step by step

Efficiency: How to



Multiplicity : Standard & After homogenization





7







Relative Deviation to center position

Relative deviation = Δ Nhit / Nhit

Nhit: the number of hits for beam position centered

 Δ nhit: the difference between other position and centered position

Year	Energy	Standard database		Uniform database		
		Pos1	Pos2	Pos1	Pos2	
2017	40GeV	-4.2%		-2.8%		
	80GeV	-6.0%	-6.6%	-0.5%	0.1%	
2018	50GeV	5.2%		1.9%		
	70GeV	10.0%	-3.9%	5.6%	1.4%	/

Low energy beam data analysis

- Data samples were taken at PS, May 2015
- Energy(GeV) : 3, 4, 5, 6, 7, 8, 9, 10, 11
- Contamination : muons , (since using electron eliminator in test beam period, the electron contamination is negligible)
- Simulation: FTF_BIC , geant4.9.6

Event Selection



Energy reconstruction

8GeV



Linearity & resolution



Conclusions

• After apply homogenization process, the perfomance of SDHCAL is improved

• The results of low energy beam data keep agreement with 20-80GeV SPS data.

Back up







Event selection



In the simulation, efficiency > 90% at muon rejection rate > 99%

Event selection

Nlayer< 42 && nHit/nLayer >2.5 && Cos(theta) > 0.95

