



The CALICE test beam programme

Fabrizio Salvatore, RHUL (for the CALICE Collaboration)

- The 2006 CERN test beam Data taking summary
- The 2007 CERN test beam Installation Data taking overview Detectors' performances
- The 2008 FNAL test beam Installation Data taking plans
- Conclusions and Outlook



CALOR08, 2008 International Conference on Calorimetry in HEP





Analogue AHCAL prototype

- 38 layers of scintillator tiles (90x90 cm²) with steel absorber (15 in 2006 tb)
- High granularity
 - $> 3x3 + 6x6 + 12x12 \text{ cm}^2 \text{ tiles}$
 - 30 modules with fine granularity (216 tiles) and 8 with coarse granularity (141 tiles)
 - ➢ 7608 readout channels (SiPM)
 - > Total interaction length = 4.5 λ
- Common DAQ for ECAL+AHCAL+TCMT
- Measurements of shower leakage and μ identification provided by Tail Catcher + Muon Tracker (TCMT)
 - > 96 cm of iron absorber with 16 layers of 5*50 mm² scintillator strips (~10 λ)

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Summary of the data taken

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Summary of the 2006 test beam

- Analysis of 2006 data being finalized
 More than 9TB of data to analyze !
- Excellent performance of the ECAL
 - Very encouraging results on resolution, linearity and longitudinal shower development will be discussed during this conference
 - ➤ Two papers about to be submitted to JINST
- Excellent results from e/π AHCAL analyses
 - Very good electromagnetic and hadronic studies will be discussed at this conference
 - Important for tuning of MC programmes (GEANT4)



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	 The test beam programme: energies and particle types Very intense test beam programme > 7 weeks of continuous data taking (July 5th → August 22nd) 						
		F	Proposed in TB plan	Collected during TB			
	Energy (GeV)	6,8,10),12,15,18,20,25,30,40,50,60,80	6,8,10,12,15,18,20,25,30,40,50,60,8 0,100,120,130,150,180	50,8		
	Particles		π^{\pm}/Θ^{\pm}	π [±] /e [±] /protons			
	 π/e (π/p) separation achieved using Cherenkov threshold detector filled with He (N₂) gas ➢ Possible to distinguish π from e(p) for energies from 25 to 6 (80 to 30) GeV 						
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Summary of 2007 test beam

- The 2007 test beam has been a huge success !
 - All active elements of calorimeters completed
 - Movable mechanics commissioned
- The test beam programme has been completely fulfilled, thanks to the hard work of everyone involved and to the extra weeks given to us by CERN
- The participation in the test beam has been incredible and full of enthusiasm from everyone in the collaboration
- We have ~14 TB of data available on the grid ready to be analyzed
- Successful tests of SciWECAL and DHCAL prototypes also performed

> See D. Jeans' and J. Repond's talks at this conference

Analysis of 2007 data under way

- Analysis of 2007 test beam data has started
 - ➤ ECAL

Physics performances: linearity and resolution
 Detector performances: study of noise of Si detectors
 Irradiation of test PCB with integrated electronics

> AHCAL+TCMT

 Physics performances: linearity and resolution
 Detector performances: calibration of SiPM temperature dependence of SiPM signal

Particle flow algorithms applied to TB data

Comparison with existing MC models: characterization of electromagnetic and hadronic showers

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The 2008 test beam at FNAL

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SiWEcal and AHCAL already installed at MTBF Data taking started on 1st of May !

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 Plans for the 2008 test beam						
• Two tes						
 ≻ 1-27 ≻ 1-23 • Plan to 	 1-27 May & 8-29 July 2008 – SiWECAL+AHCAL 1-23 September 2008 – SciWECAL+AHCAL Plan to test ECAL+DHCAL prototypes in spring 2009 					
	Propo	sed plan for 1 st period	Achieved at 2007 CERN TB			
Particle types		π±/e±	π±/e± /p	1		
Energy points 6, 10		, 12, 15, 20, 30, 40, 60 GeV	6 to 180 GeV			
Angles	0, 10, 20, 30 deg		0. 10, 20, 30 deg			
Calibration with µ events	6M events @ 120 GeV (broad beam)		~25M events @ 80 GeV (narrow and broad beam)			
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We have the first events !



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We have the first events !





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Conclusions and Outlook

- Our test beam programme is very ambitious and is giving excellent results
- 2006 results are being published
 - One paper on the SiW prototype has been submitted to JINST this week !
 - One paper on ECAL analysis of 2006 data is under Collaboration review
- Analysis of the 2007 data is well under way
 - > Still a lot to do, but it is really worth doing it !
- Excellent results of the test on SciWECAL and DHCAL
 > Details discussed in other talks at this conference
- We are ready for our next phase of beam tests
 Prototypes are already taking data @ FNAL-MTBF

Looking forward to first FNAL results !

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Summary of data-taking time

Time since 5 th of July	4 147 200 sec
14.4s super-cycle	2 389 798 sec
16.6s (20.4s) super-cycle	889 829 sec
Power cuts	86 400 sec
Summer students	57 600 sec
π/e/p data	1 790 698 sec
muons (100x100)	153 976 sec
muons (20x20)	131 752 sec
AHCAL only	365 195 sec
Calibration	318 447 sec
SPS up-time	79.1%
Beam controlled by H6B	76.1% (96.2% of up time)
DAQ taking analysis data	6.1% (81.5% of beam in H6B)
DAQ on calibration	15.1%