

Ecal Overview

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General View



Main modifications to the test run ECal

- New mother boards: Done
- Large area APDs: Done
- Light monitoring system: Done
- New preamplifiers: Done
- Update of the mounting mechanics: Designed

Ecal Group meetings

– Held on Mondays 11 AM EST (?)



Shielding

- Kyle's studies showed extra background on the electron side
- Can we shield part of this background?
 - First results are very promising to reduce this low energy background!
 - A. Epsztein & G. Charles







• Large Area APDs

- All tested and glued (see Michel Garçon's talk)
- Grouped and map of their position in the Ecal (see Gabriel Charles' talk)

Preamplifiers

- All ready and tested, with spares
- Placed in the calorimeter to reduce gain variance (see Gabriel Charles' talk)

The Amplification chain is now well understood

- See internal note from G. Charles and A. Celentano



Calibration Strategy

• We have various ways to calibrate

- Light Monitoring System (see Andrea's talk)
- Cosmic muons
- Coulomb and quasi-elastic scattered electrons (see Luca's talk)
- Neutral Pions (we are late on this one)

They are very complementary

- They allow to cover, low to high energy range of detection
- LMS should give indication of radiation damages with color difference
- Based on specific runs or beam data to understand effect of the backgrounds



Cosmics (H. Vance)



- Scintillator is BC408 from Hall B TOF
- Each scintillator is 75 cm x 22 cm x 5.08 cm
- Top/Bottom provide trigger







Cosmics (H. Vance)



- Expected trigger rate: 24 Hz
- Simulations use average 4 GeV muons (from PDG) in all directions with cos2 dependence.
- Simulations include random sampling Gaussian to simulate pre-amp noise and 7.5 MeV crystal threshold.



Cosmics (H. Vance)

- Analysis code can work two ways:
 - Track fitting code fits a straight line fit through crystals that are hit. The fit can be compared between the top and bottom halves of the Ecal. This still sums energy in each half.
 - Reconstruction clustering will still find a local maximum energy crystal in the top and bottom halves of the Ecal. This can make two clusters where the energies in the top and the energies in the bottom can be compared.



Monitoring (A. Celentano)

•Entirely developed within the HPS online monitoring application (J. McCormick)

•Displayed plots have been discussed within the Ecal group.

•The Ecal event display (K. McCarty) has been integrated in the application and provide access to single-channel information and displays

🔬 🔿 HPS Mo	onitoring - andrea@andrea-LAPTOP	\odot \odot
<u>C</u> onnection <u>E</u> vent Job Log		
	Ecal Hit Plots Ecal Cluster Plots ECAL DAQ Plots Ecal single chan	iel plots
Disconnect Resume Next Event	ECAL System Monitoring ET System Monitoring	Ecal Monitoring Plots
Connection Status:	HPS ECal Monitoring Plots	
Connection Settings Event Monitor Job Settings	HPS-TestRun-v5 : EcalCalHits : Hit Count HPS-TestRun-v5	: EcalCalHits : Occupancy
		0.0150
Flapsed Time [seconds]: 449		
		0.0125
Events Processed: 168		
Average Events Per Second: 3.66		0.0100
Run Number: 1361		
Run Started: May-18-2012 12:29:45		
Bun Stopped:		0.0050
Events in Run:		0.0025
Session Supplied Events: 168		
Total Supplied Events: 168	-20 -10 0 10 20 -20 -10 0	10 20 0.0000
Event Refresh: 1		
	5	
Message Date Level		
Log Level was changed to <aljune-13-2014 15:28:44.176="" info<="" th=""><th></th><th></th></aljune-13-2014>		
Starting a new monitoring see, June 13-2014 15:20:14-360 INFO		
Beset default AIDA tree lune 13-2014 15:30:11 826 INFO		
Setting up I CSm. upe-13-2014 15:30:11.826 INEO		
LCSim steering <org 15:30:11.826="" config<="" hps="" june-13-2014="" stee="" th=""><th></th><th></th></org>		
Setting up steering resource June-13-2014 15:30:11.951 CONFIG	-2 -2	
Initializing event builder <org 15:30:12.657="" config<="" june-13-2014="" th=""><th>-3 - 0.3</th><th></th></org>	-3 - 0.3	
Successfully initialized event b June-13-2014 15:30:15.063 INFO		
LCSim setup was successful. June-13-2014 15:30:15.063 INFO	0,2	
Connecting to ET system. June-13-2014 15:30:15.063 INFO		
Connection status changed t June-13-2014 15:30:15.063 FINE		
Connection status changed t June-13-2014 15:30:15.153 FINE	-20 -10 0 10 20	



Monitoring (A. Celentano)

Foreseen tabs:

•"Main": the default tab, with general plots

•"Single-hit"

- •"Clusters"
- •"DAQ"
- •"Event-display"





Monitoring (A. Celentano)

- What is missing:
 - Final integration with the new conditions system.
 - Actually, both the the "new" and "old" system are used.
 - Need to coordinate this with the whole Ecal software transition to the new system
 - Add strip-charts to quickly acknowledge any change during time
 - New feature just added to the monitoring application
 - Define a set of "standard" plots to be displayed during "standard" (non-commissioning, non-special) runs to people on shift
 - Are the plots in the "main" tab appropriate?



ECal box

- Structure holding the crystals is unchanged
- Box has been modified to fit the new electronics (Mother boards and LED system)
- All is ready and in JLab
- ECal construction begins next week!





Installation of ECal

- Crane access difficult for top ECal, impossible for bottom Ecal (~200kg/ECal)
- Necessitate to remove the ECal vacuum chamber for installation
- ECal halves are fixed on threaded rods that allow precise vertical positionning





Solution to crane

- Install lifting devices on the mounting system directly
- System rigidity has been reinforced
- ECal Mobility
 - Necessary to access the PA and LMS









Schedule

GANTT.			2014 Ship	tools for APDs o	IPN Last LED tested		LeShip to Lab SI	hip to JLab <mark>tal Ready</mark>		Mounting System d	one <mark>ssembled</mark> ECa	l is Ready
Name	Begin date	End date	February	March	April	Мау	June	July	August	September	October	November
IPNO	8/9/13	8/1/14										
INFN	8/9/13	8/1/14										
Glasgow	8/9/13	8/1/14										
 Multiple collaborators in JLab 	8/9/13	8/1/14										
Outside Procurement	8/9/13	8/1/14										
🕨 🍨 Mother Boards	9/2/13	3/26/14		_	۹							
 Preamplifiers 	11/1/13	5/14/14		_		_	1					
🕨 🔍 LED Monitoring System	9/2/13	6/13/14				_						
► ● New APDs	10/1/13	6/17/14		_		_		l l				
🕨 🔍 ECal Box Mechanics	11/1/13	6/9/14				-	_					
 Mounting System 	4/8/14	8/25/14										
Mounting System Design	4/8/14	6/9/14										
 MS Procurement 	6/10/14	7/21/14	-				È.	1				
MS Construction in IPN	7/22/14	8/11/14						É.	1			
MS Shipment	8/12/14	8/25/14							Ľ.	L III		
Mounting System done	8/26/14	8/26/14							-	∳		
 Assembly 	6/23/14	9/19/14										
 Assemble ECal 	6/23/14	7/11/14										
Install ECal in the Hall	9/8/14	9/12/14								Ė-		
 ECal Connections 	9/15/14	9/19/14								<u> </u>		
ECal Assembled	9/22/14	9/22/14								•		
 ECal Commissioning 	9/22/14	10/17/14										
Run LMS calib	9/22/14	10/3/14								L L L L L L L L L L L L L L L L L L L		
Cosmic Run	10/6/14	10/17/14										
Integrate Slow Controls	9/22/14	10/17/14								La constante da const		
 ECal is Ready 	10/20/14	10/20/14									•	
			51									

- Delay in the mounting system design and production leads to delay of the commissioning
- End date now expected for 10/20/2014



Summary

• Core parts are all finished and arrived in JLab

- ECal box with all new electronic elements
- Light Monitoring system parts
- Crystals with their new APDs
- Studying the addition of W shielding
- We have a good strategy for calibrations
 - Mapped APDs and PAs to reduce variations
 - 4 different calibration methods

Monitoring software is in good progress

- Some EPICS feature are still to be developed but everything is well defined
- Mechanical structure is designed
 - Includes lifting device to grab detectors
 - Has increased rigidity
 - Can be moved around "easily"
 - Leads to a 1.5 month delay for completion of the project