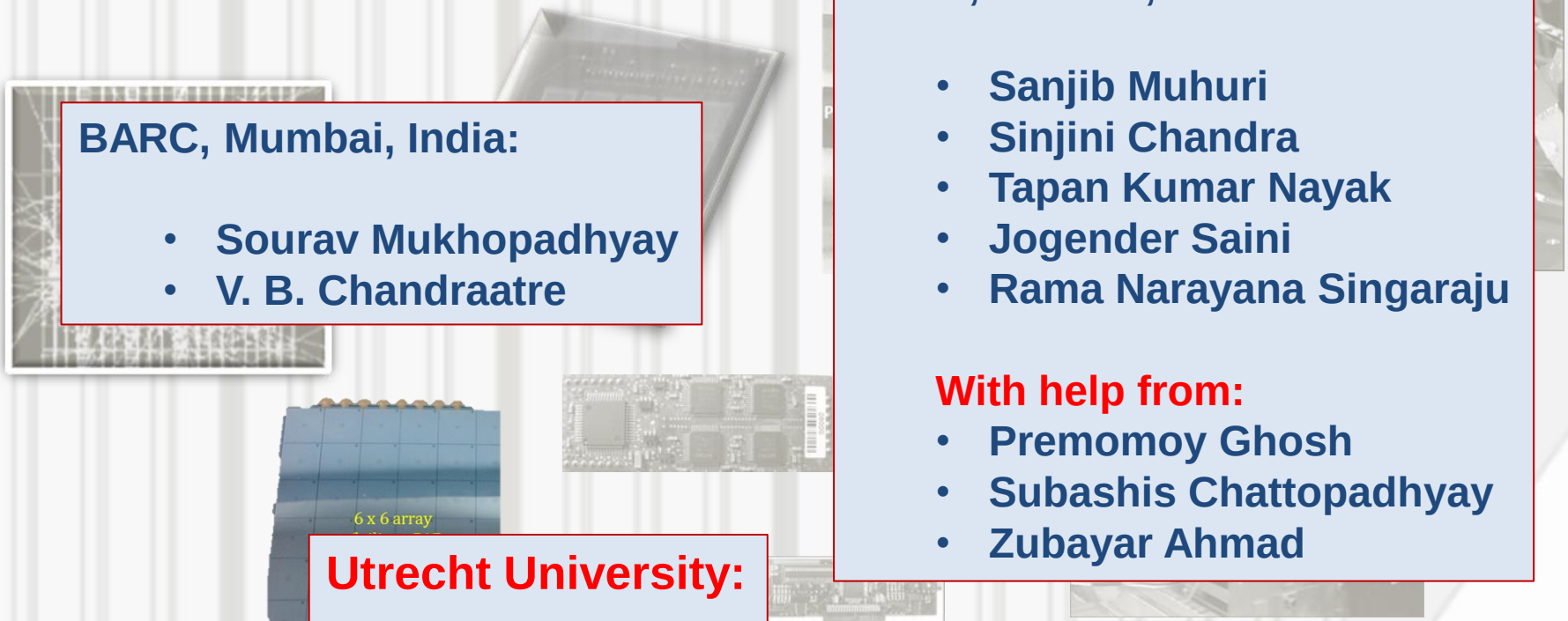
ALICE FOCAL Test at SPS
July 5-11, 2017



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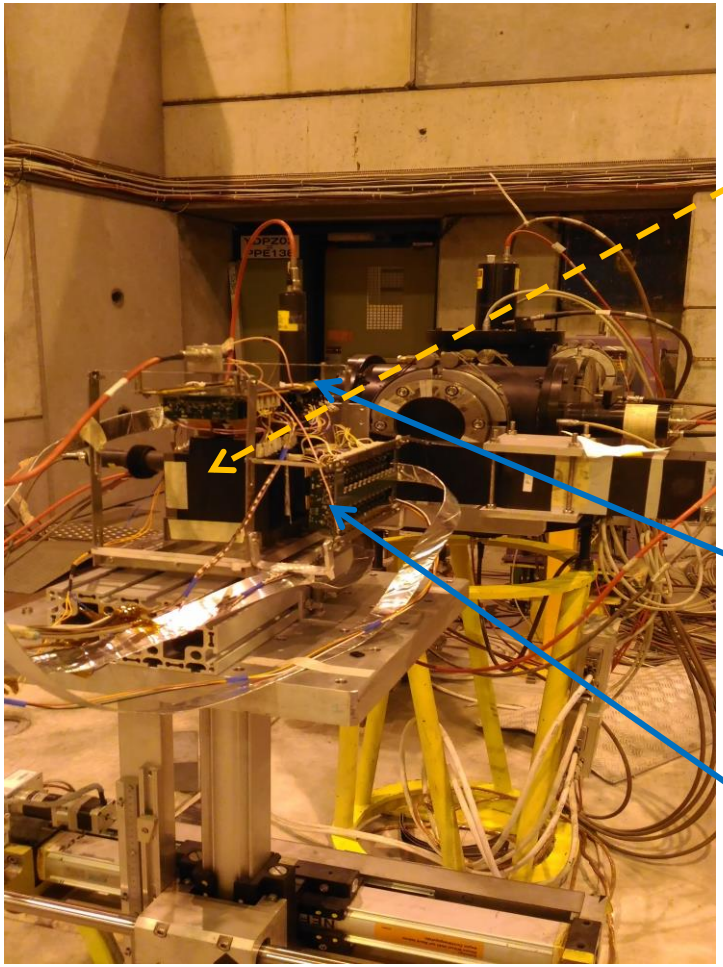
Plan for the Test Beam:

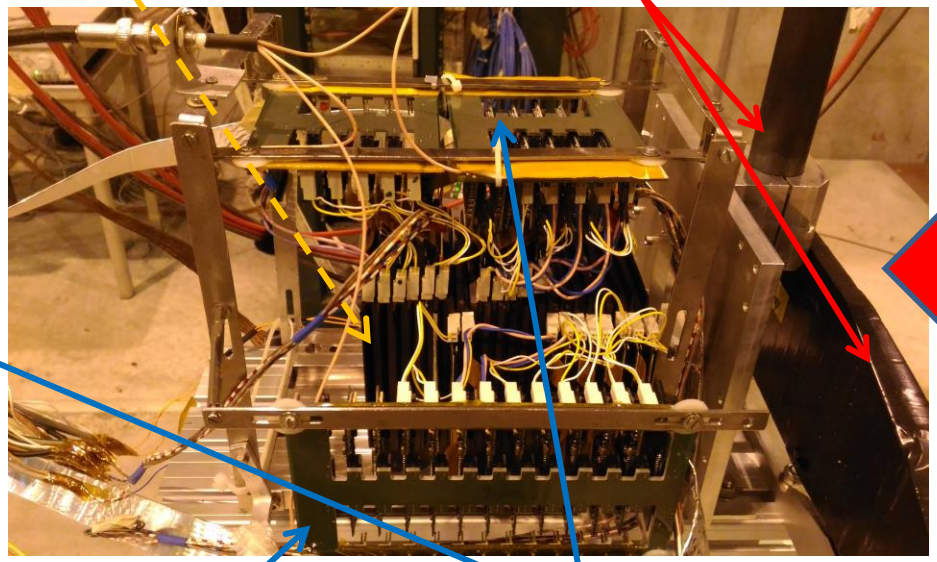
- ✓ **Intended for the test of newly developed ASIC ANUINDRA mainly.**
- ✓**Only 5 layers (8^{th} to 12^{th}) around the shower max were with ANUINDRA. Rest layers had MANAS as readout chip.**
- ✓**Data for Electron from 20 to 150GeV in steps of 10GeV had been taken.**
- ✓**120GeV hadron and 180GeV Muon data also taken.**

Experimental set up



6*6 array of 1cm^2 Silicon detector

Trigger system consist of P, H, V Scintillator.

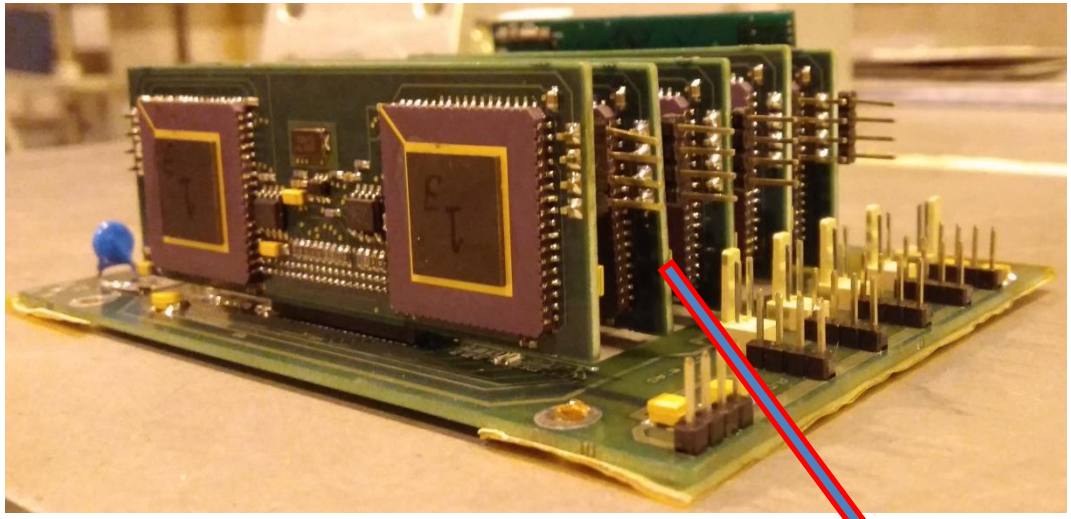


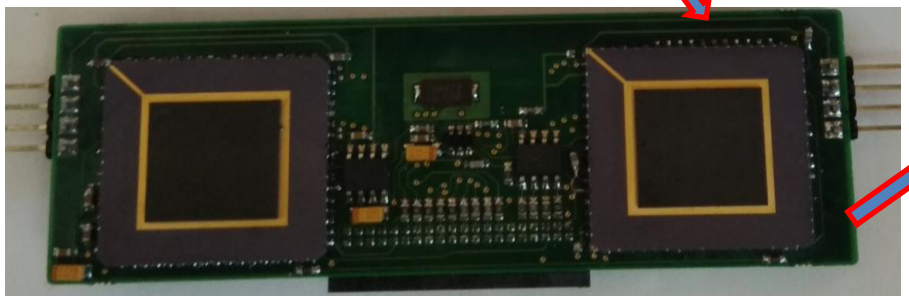
BEAM

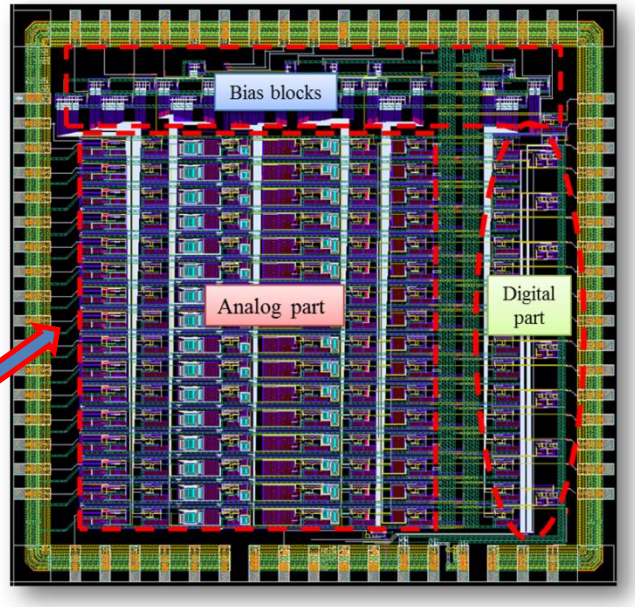
BACK-PLANE PCB for ANUINDRA CHIP

BACK-PLANE PCB for MANAS CHIP

Readout Electronics







Saturation (signal) Effects: Well taken carewith large dynamic range (~2.6 pC) compare to previous one (~600 fC).

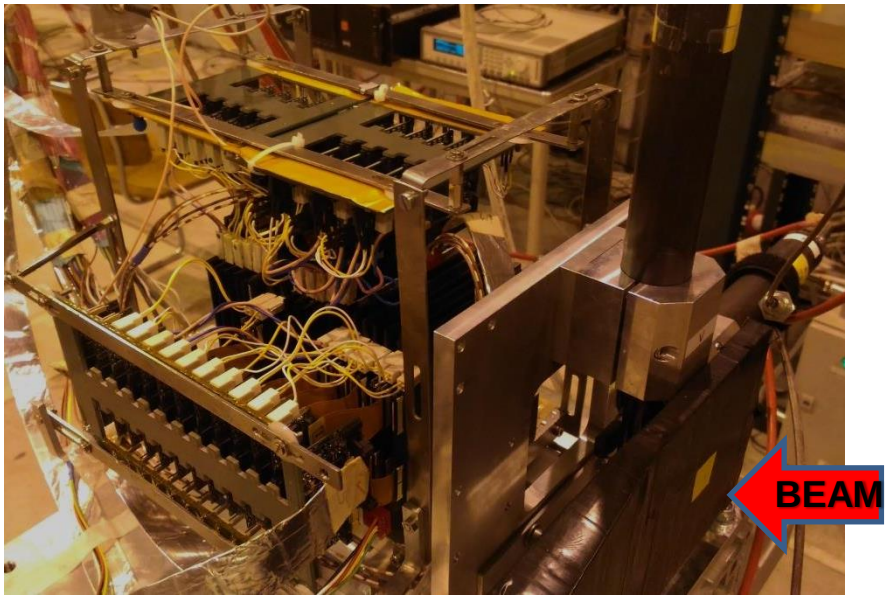
Readout Electronics

Specification	MANAS	ANUINDRA
Noise at 0 pF	500 rms electrons	700 rms electrons
Noise slope	11.6 e^-/pf	15 e^-/pF
Linear dynamic range	+ 500 fC to -300 fC	~ (2.4 - 2.6) pC
Conversion gain	3.2 mV/fC	(1-1.25) mV/fC
Peaking time	1.2 µs	1.2 µs
Baseline recovery	1% after 5 µs	1% after 5 µs
VDD/VSS	+/- 2.5 V	+5 V/GND
Analogue readout speed	1 MHz	1 MHz
Power consumption	~ 9 mW/channel	~ 25 mW/Channel
Die area	4.6 mm x 2.4 mm	~ 5.6 mm x 5.3 mm
Technology	1.2 µm standard CMOS	0.35 µm standard CMOS
Package	TQFP-48	CLCC-68

With newly developed ANUINDRA readout chip, saturation in energy measurement is expected to go away. As the dynamic range of the chip is larger by a factor of ~5, the chip should be able to take data up to 100GeV safely. A compromisation has been introduced in terms of noise which is larger in case of ANUINDRA.

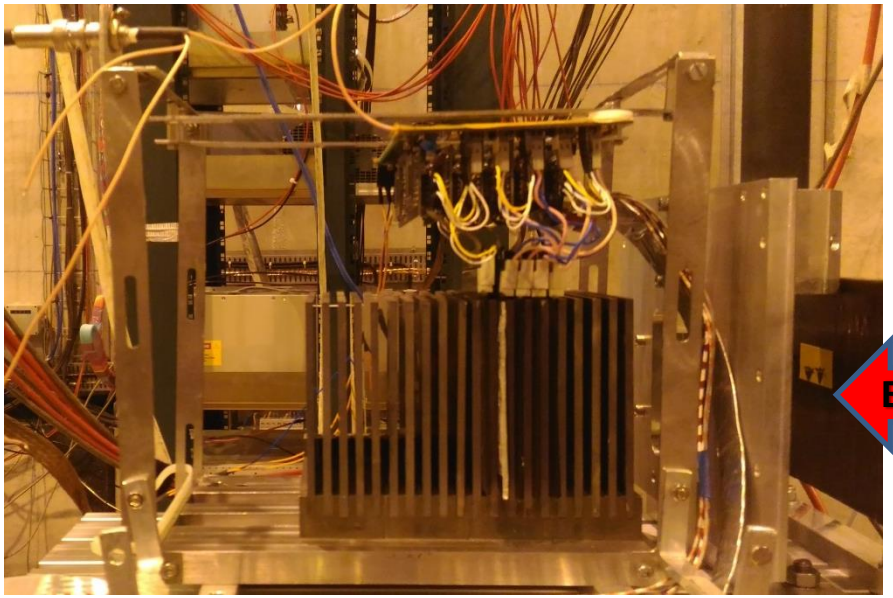
Experimental set ups

Setup-I



In setup-I, 0th to 7th and 13th to 21st (16) layers were populated with MANAS and rest are with ANUINDRA readout.

Setup-II



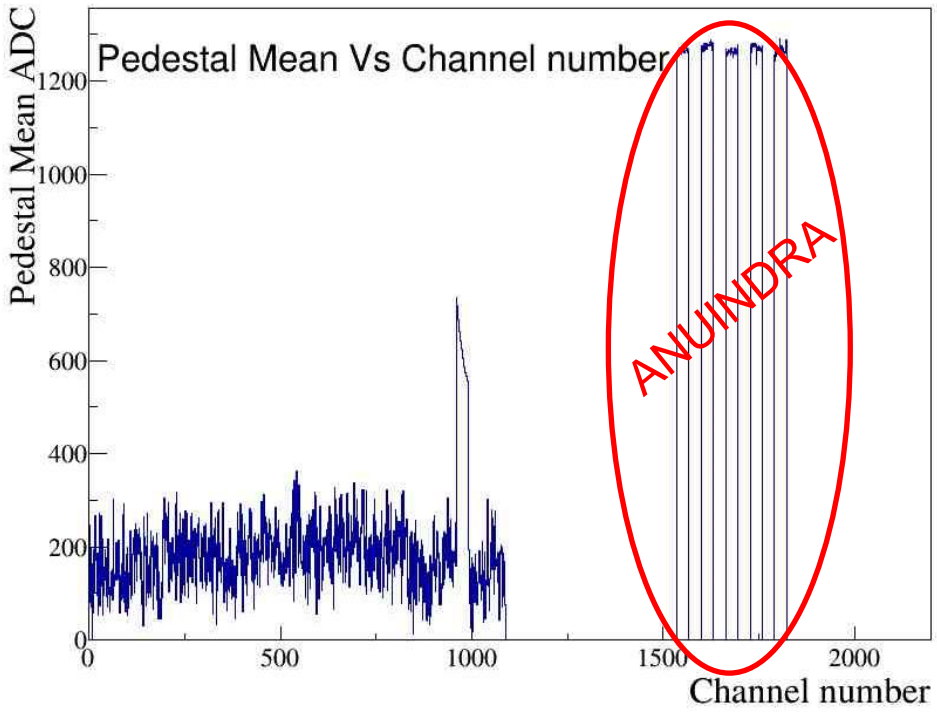
In setup-II, Only ANUINDRA readout were used for 5 layers at a time. All other layers had only tungsten plates. Data were taken for 5 configuration with detectors position shifted.

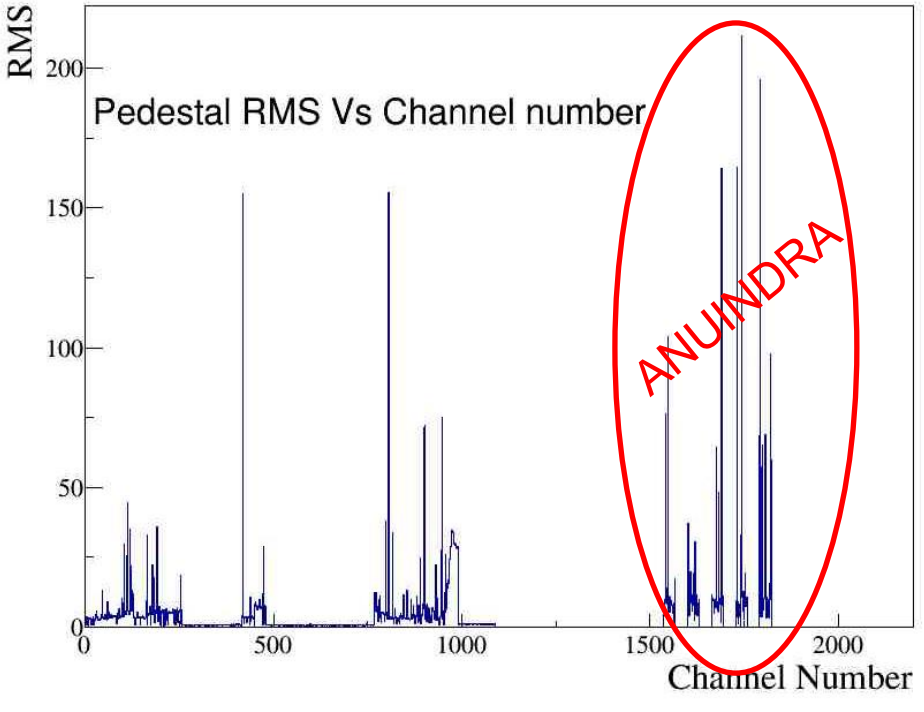
Events Collected

Beam	Energy (GeV)	Setup-I	Setup-II				
			Config-1	Config-2	Config-3	Config-4	Config-5
Electron	20	97k	22k	32k	This will be served by the Setup-I	22k	12k
	30	32k	-	-		-	-
	40	82k	23k	32k		22k	22k
	50	76k	-	-		-	-
	60	64k	23k	35k		22k	22k
	70	38k	-	-		-	-
	80	58k	22k	32k		22k	22k
	90	67k	-	-		-	-
	100	109k	22k	27k		27k	32k
	110	103k	-	-		-	-
	120	63k	17k	35k		-	17k
Hadron	120	25k	-	-		-	-

Pedestals:-

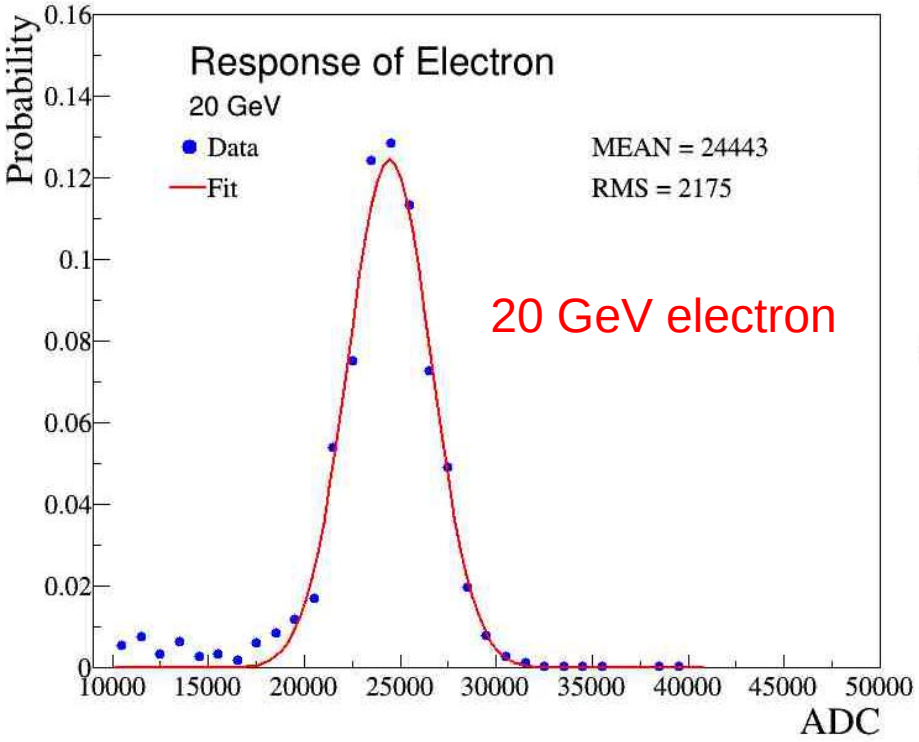
Among 21 layers of detectors, First 8-layers and last 8-layers are connected with MANAS chip. 5-layers around shower max (8^{th} to 12^{th}) were connected with ANUINDRA readout.

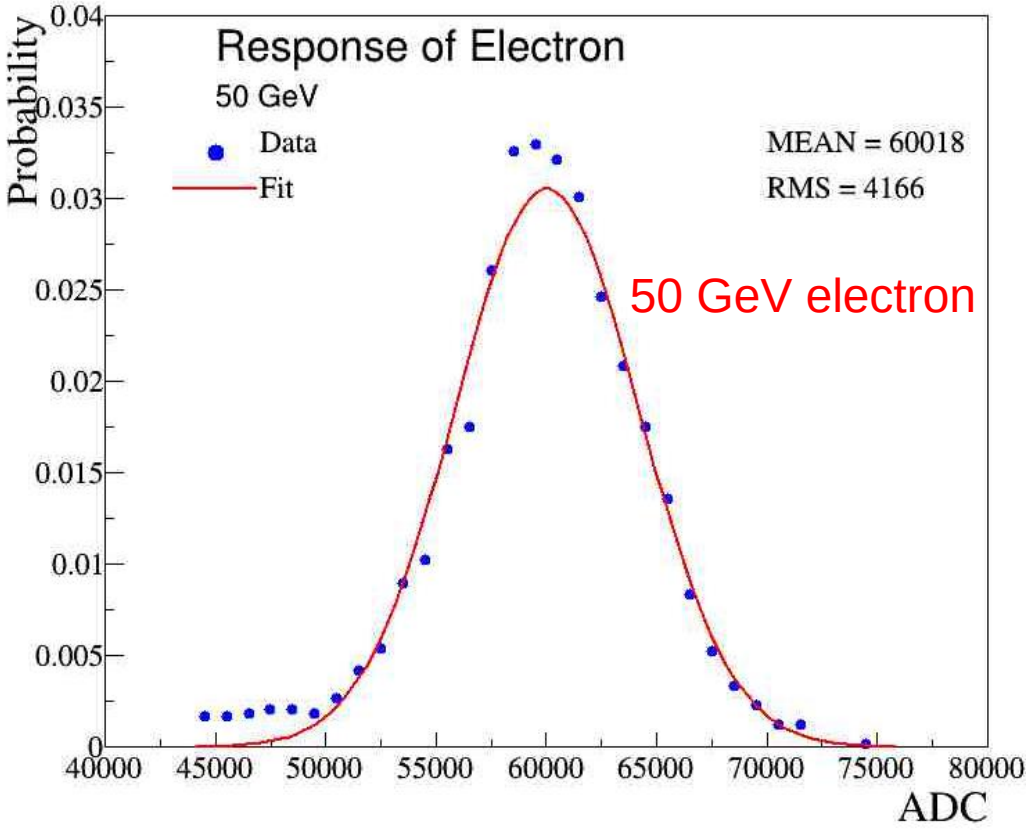




Each detector layer corresponds to 36 channel. But 4-pad are disconnected. So effectively each layer has 32 channels.

Preliminary: Total ADC:-





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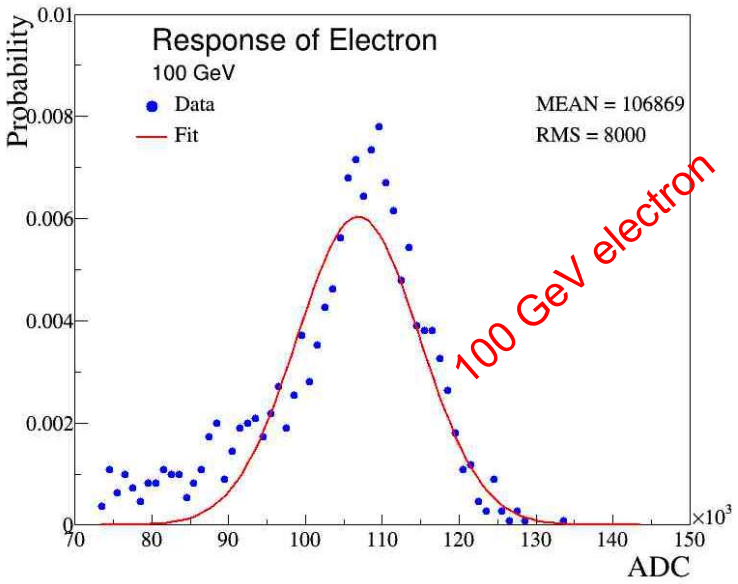
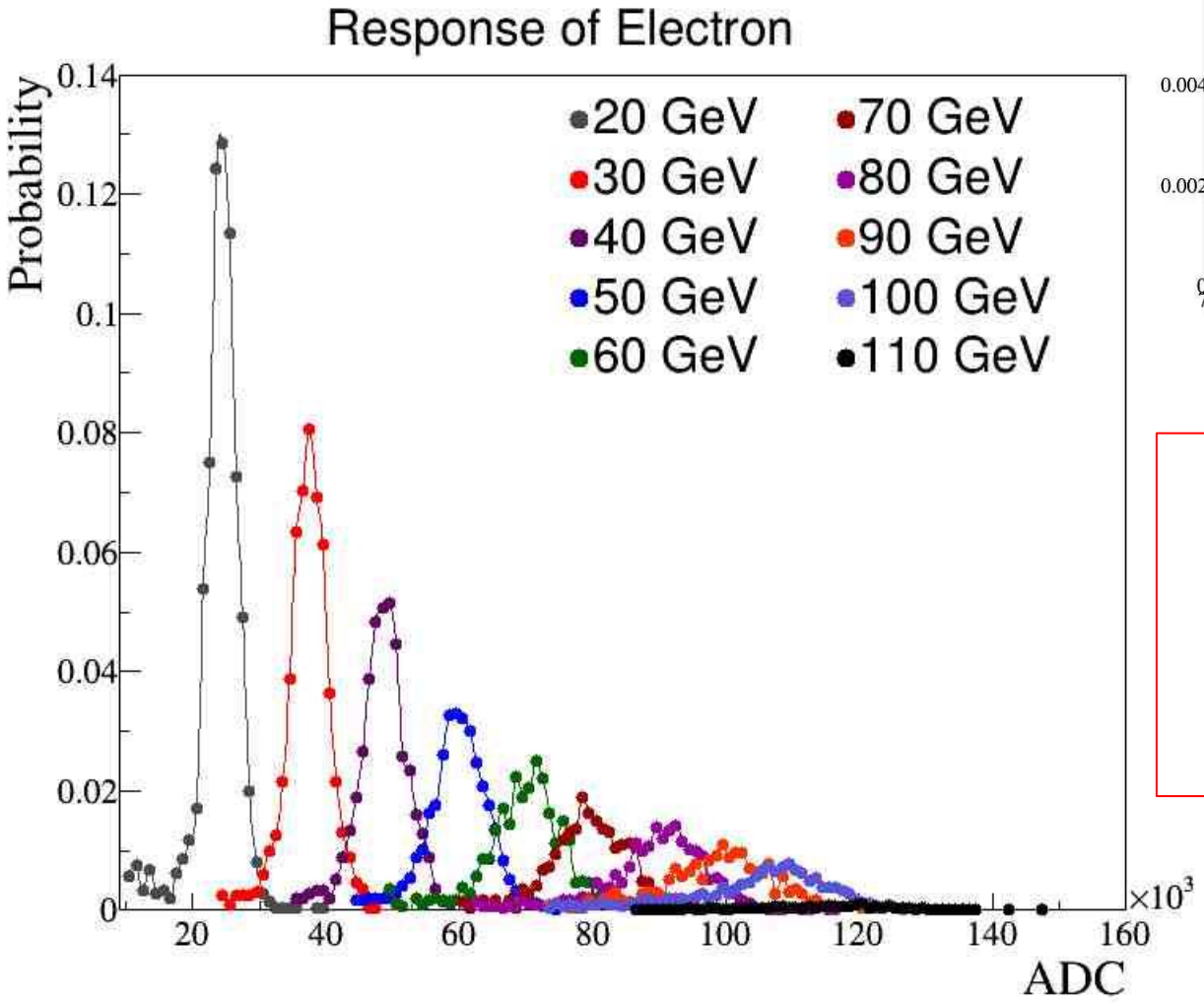


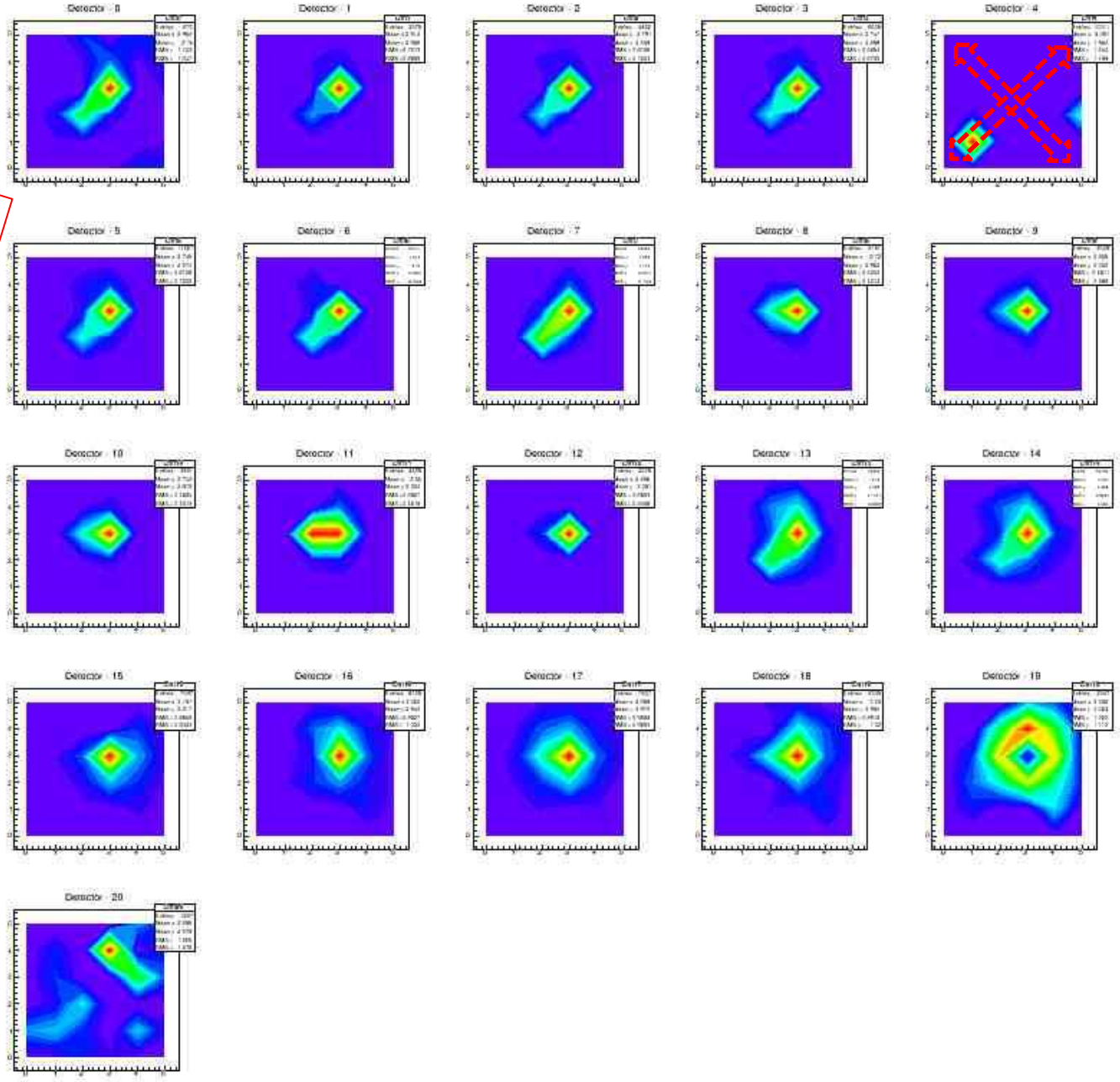


Distortion as we go up in the incident energy (beyond 80 GeV electron).

Need proper clean up of the data before final conclusion.

Preliminary:

Track of the EM shower passing through all the layers. Layer No 4 has some detector issues which could not be corrected during Test Beam.



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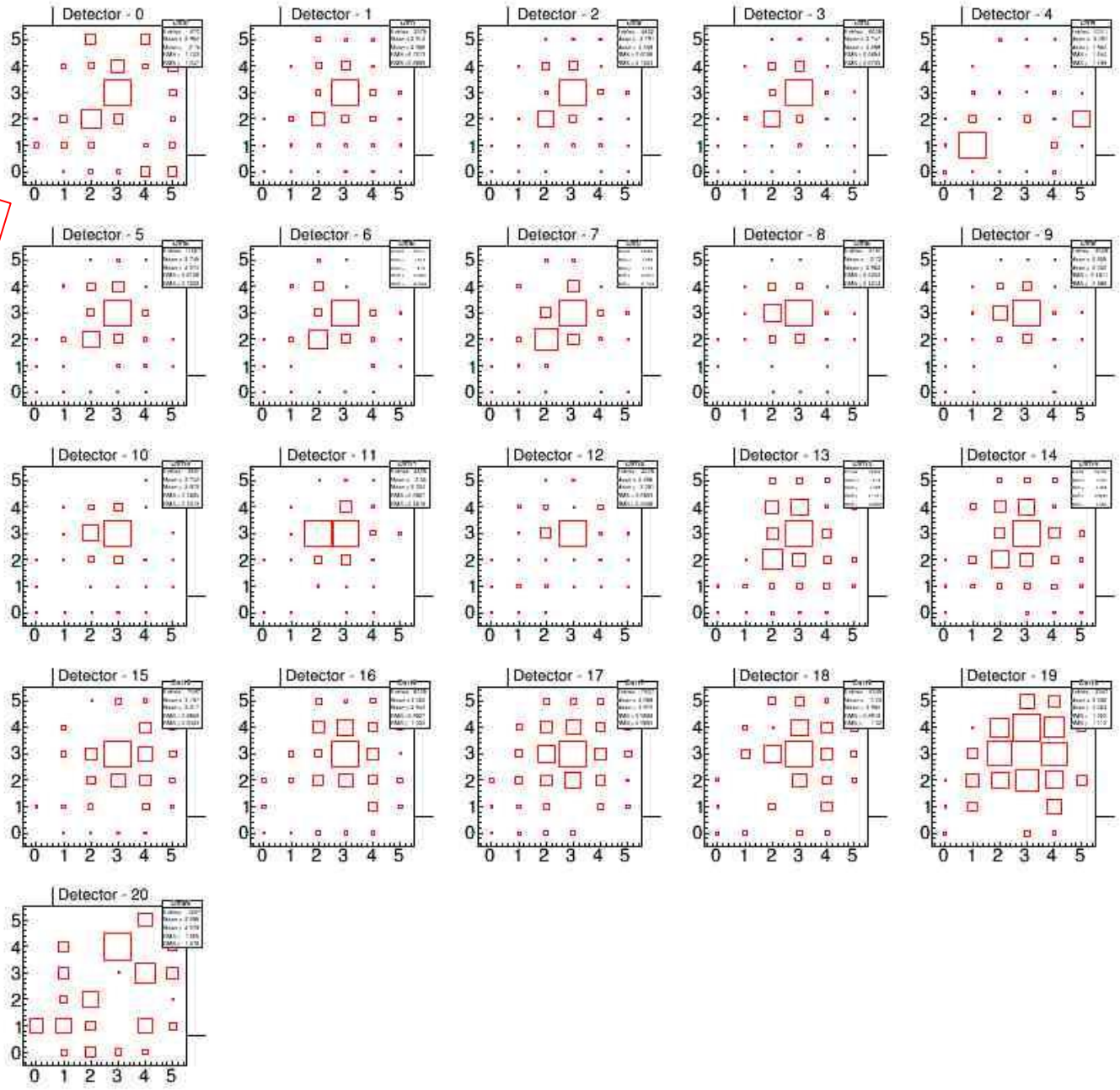
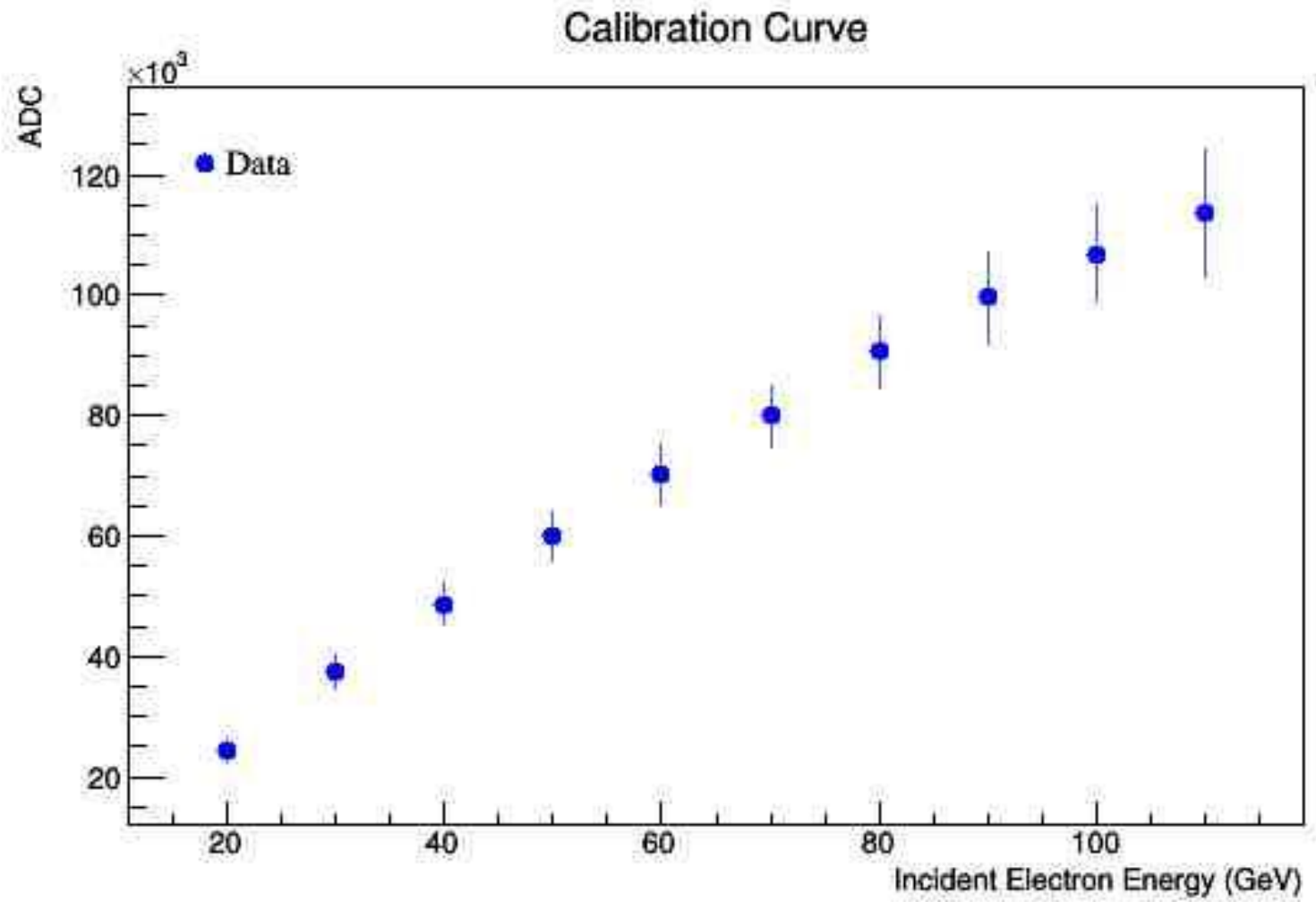


Preliminary: Total ADC as a function of incident energy:



Need data clean up before having final results. Data analysis are in progress for understanding in much more cleaner way.


Thanks a lot for your attention