

A preliminary analysis of the LumiCal test beam data

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Outline

- ✓ Test Beam set-up
- ✓ Pedestal analysis
- ✓ Signal analysis
- ✓ Evaluation of energy deposition
- ✓ Conclusions

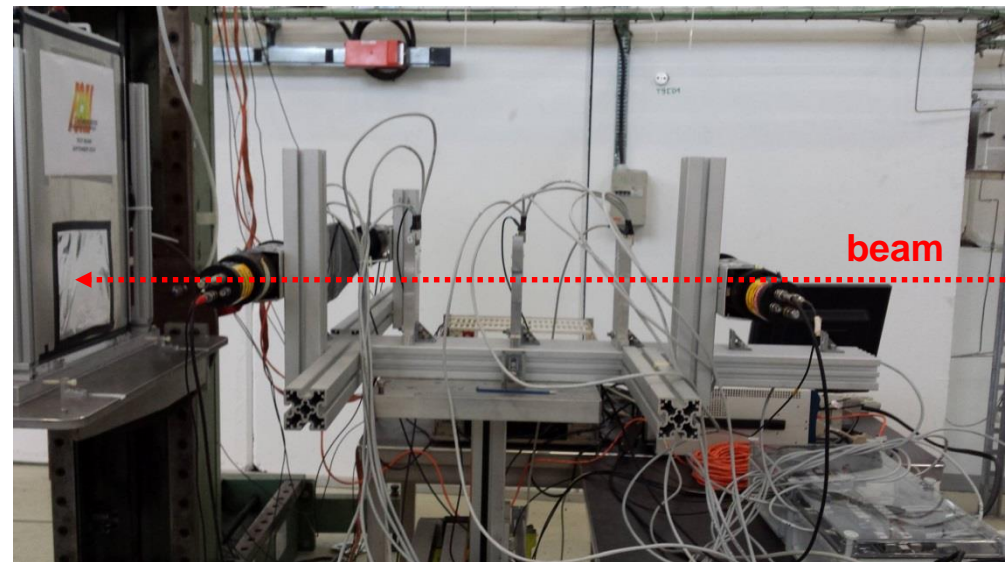
Test beam set-up



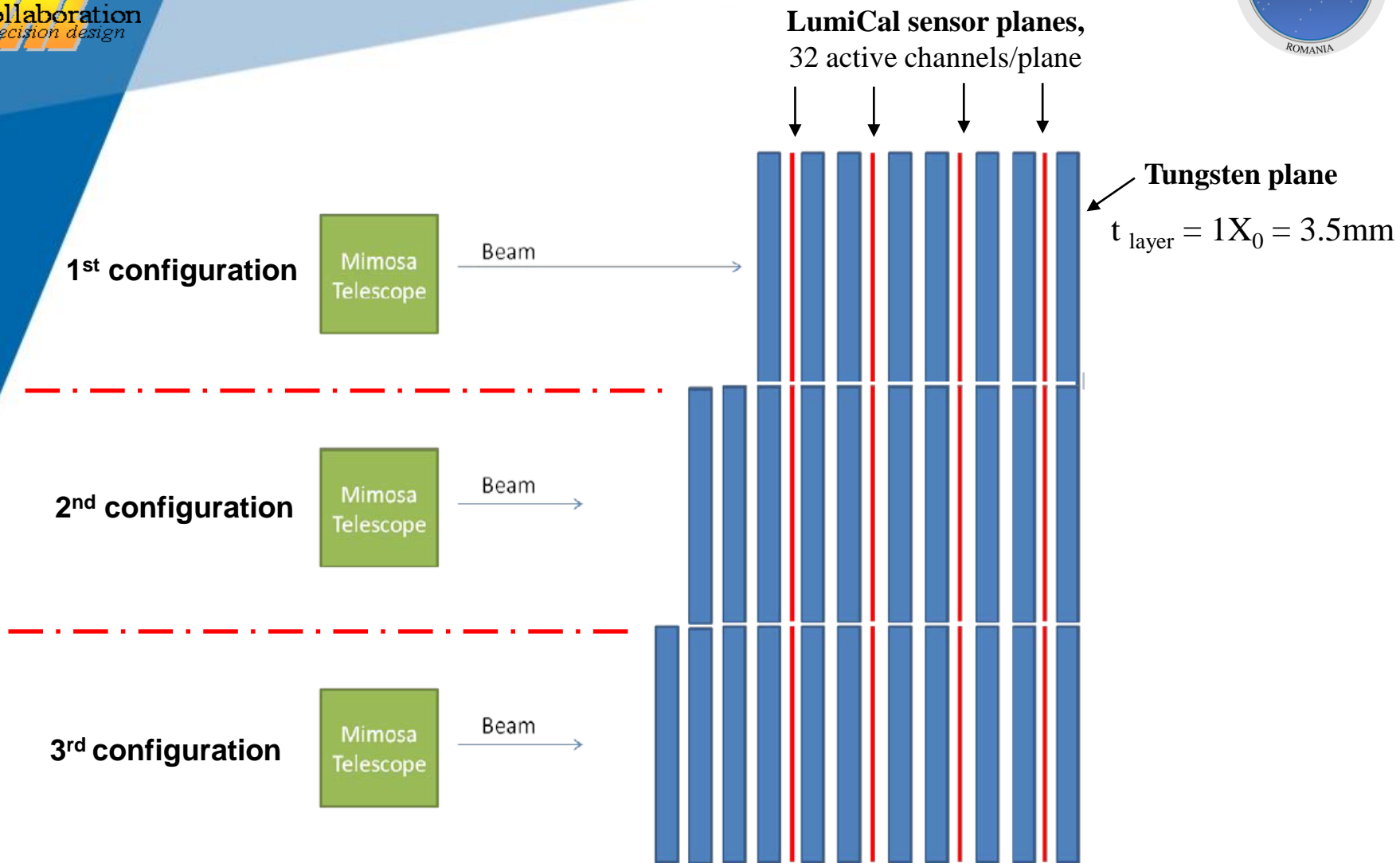
- Test Beam took place in the proton synchrotron (PS) East Area at CERN, T9 line from 22nd to 29th October 2014;
- The beam momentum is between 1 GeV and 10 GeV and the secondary beam consists of mainly electrons, muons, pions and protons;
- Particle composition in T9 line for negative polarity were:

Fraction in beam (%)

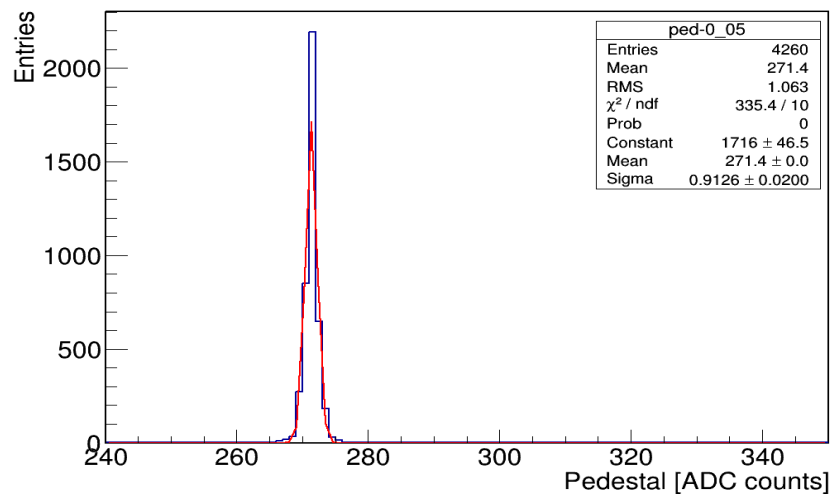
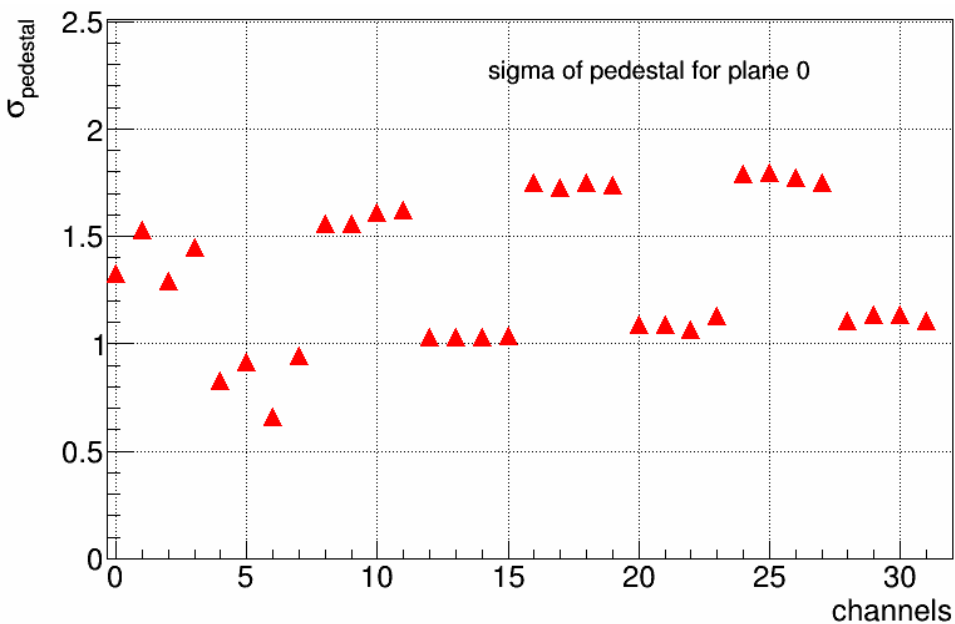
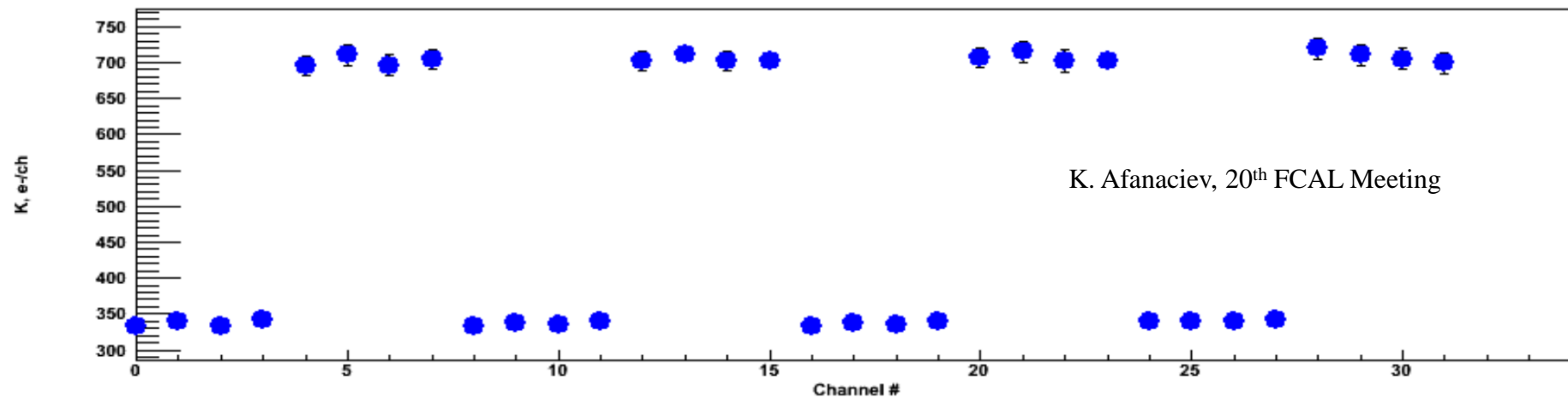
P_{beam} (GeV)	e^-	$\mu^- + \pi^-$
1	85	15
2	40	60
3	16	84
4	6	94
5	4	96
6	2	98
7	1	99
8	1	99
9	1	99
10	1	99

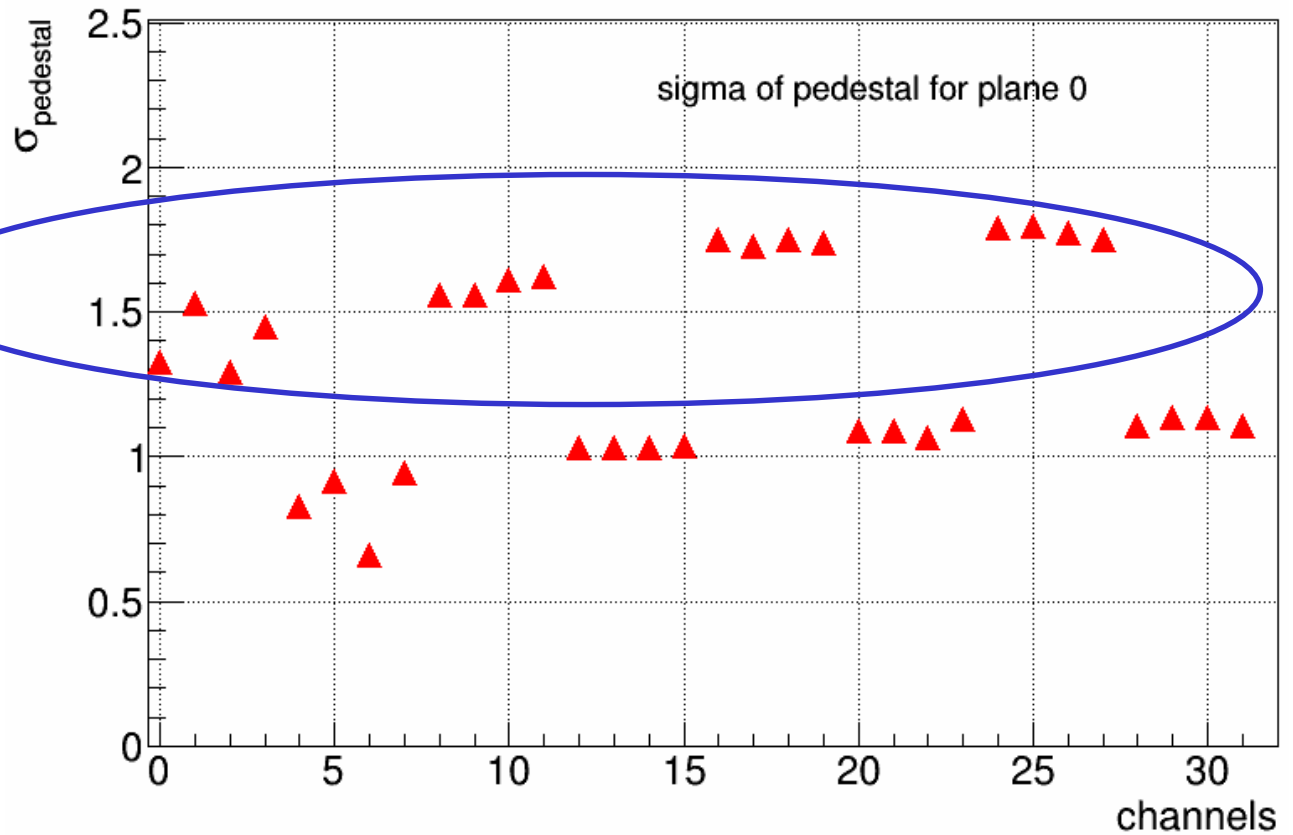


Set-up configuration



Preamp gain High, Shaper gain High





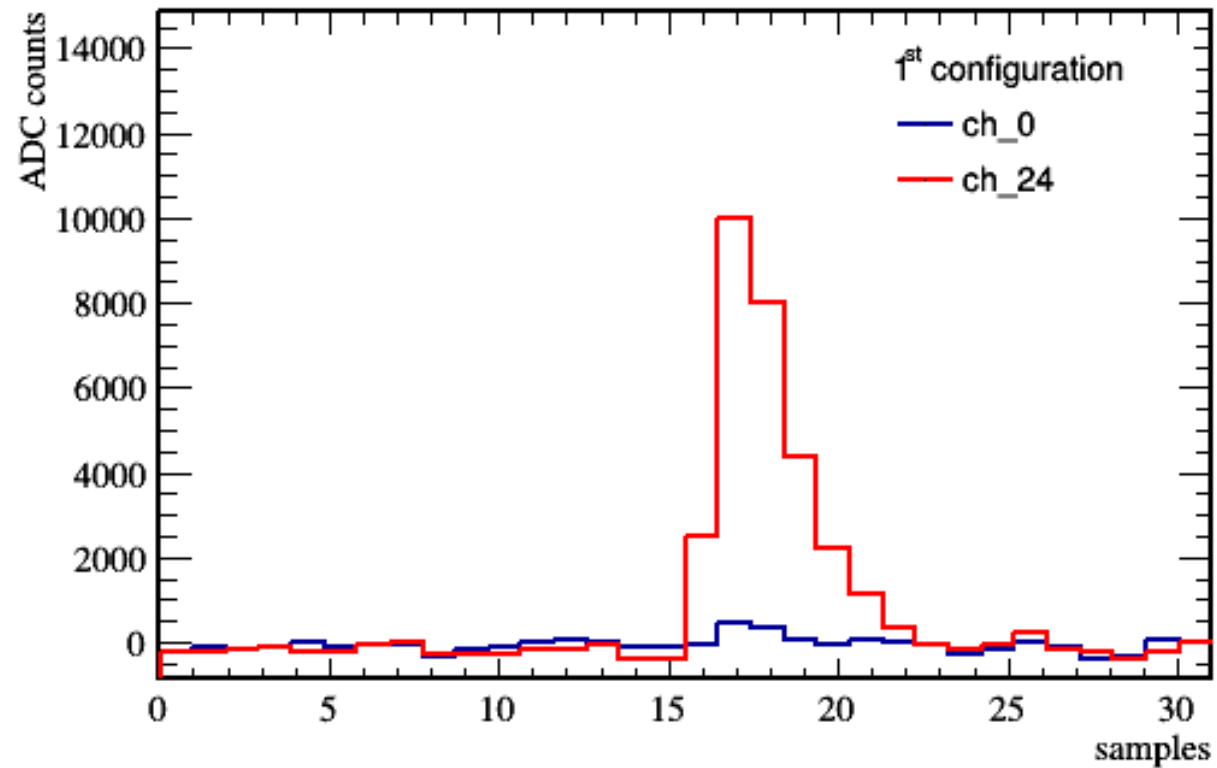
The signal for all these channels was divide by 2

Signal analysis

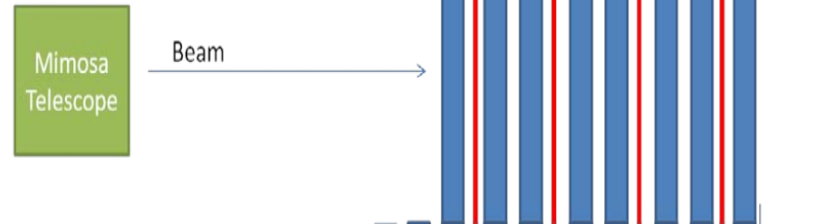


Ch13	Ch14
Ch12	Ch15
Ch11	Ch16
Ch10	Ch17
Ch9	Ch18
Ch8	Ch19
Ch7	Ch20
Ch6	Ch21
Ch5	Ch22
Ch4	Ch23
Ch3	Ch24
Ch2	Ch25
Ch1	Ch26
Ch0	Ch27
	Ch28
	Ch29
	Ch30
	Ch31

Hit map reconstruction



1st configuration

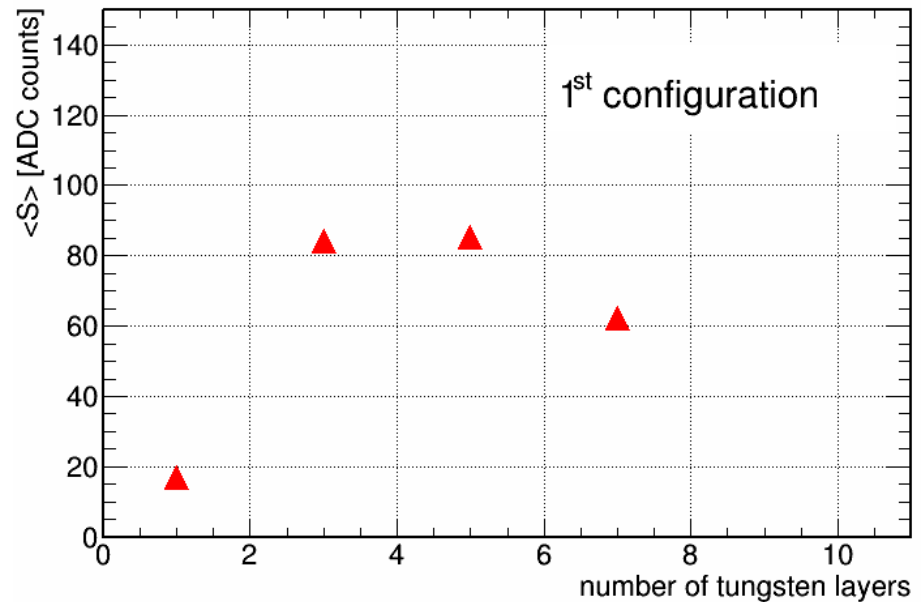


$$\langle S \rangle \sim E_{dep} = E_{el_shower} + E_{ion}(\mu^-) + (E_{\pi^-} + E_{h_shower})$$

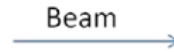
$$\langle S \rangle = \left[\frac{\sum_{i=1}^6 S_i + \sum_{i=21}^{26} S_i}{N_{ev}} \right]$$

where:

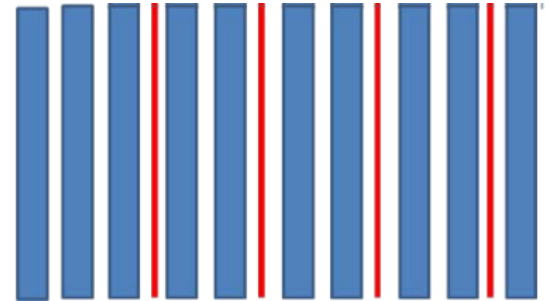
- i is the active channel
- N_{ev} is the number of events



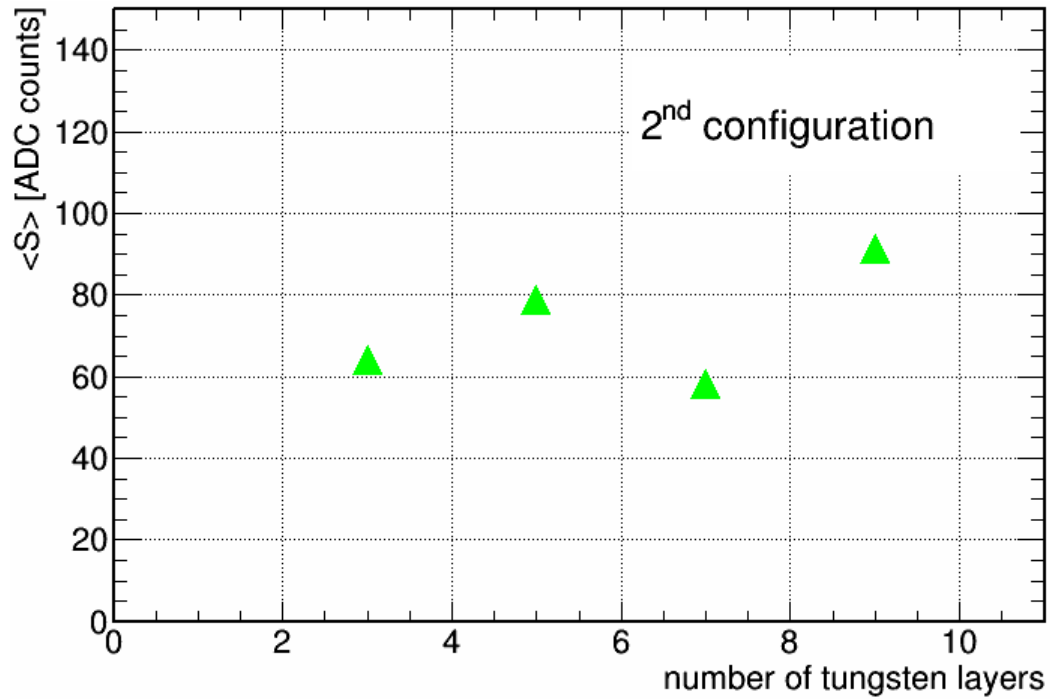
2nd configuration



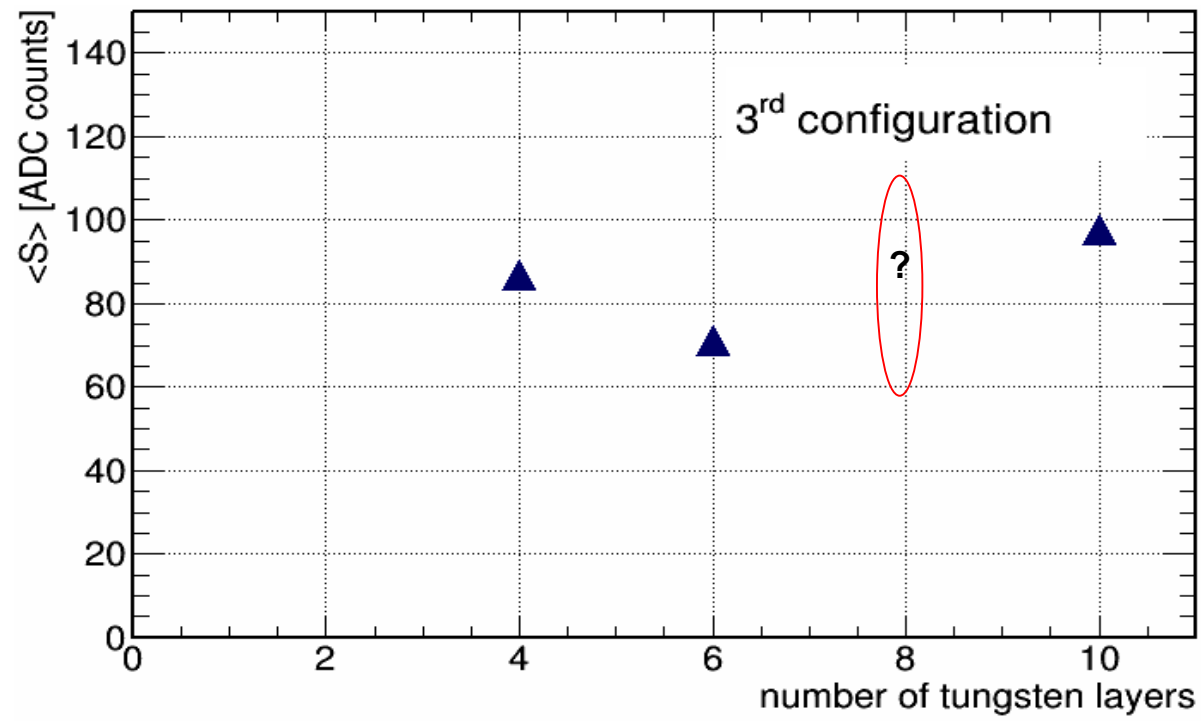
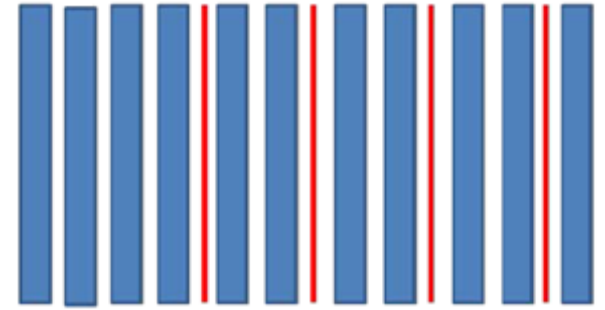
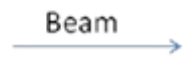
FRONT



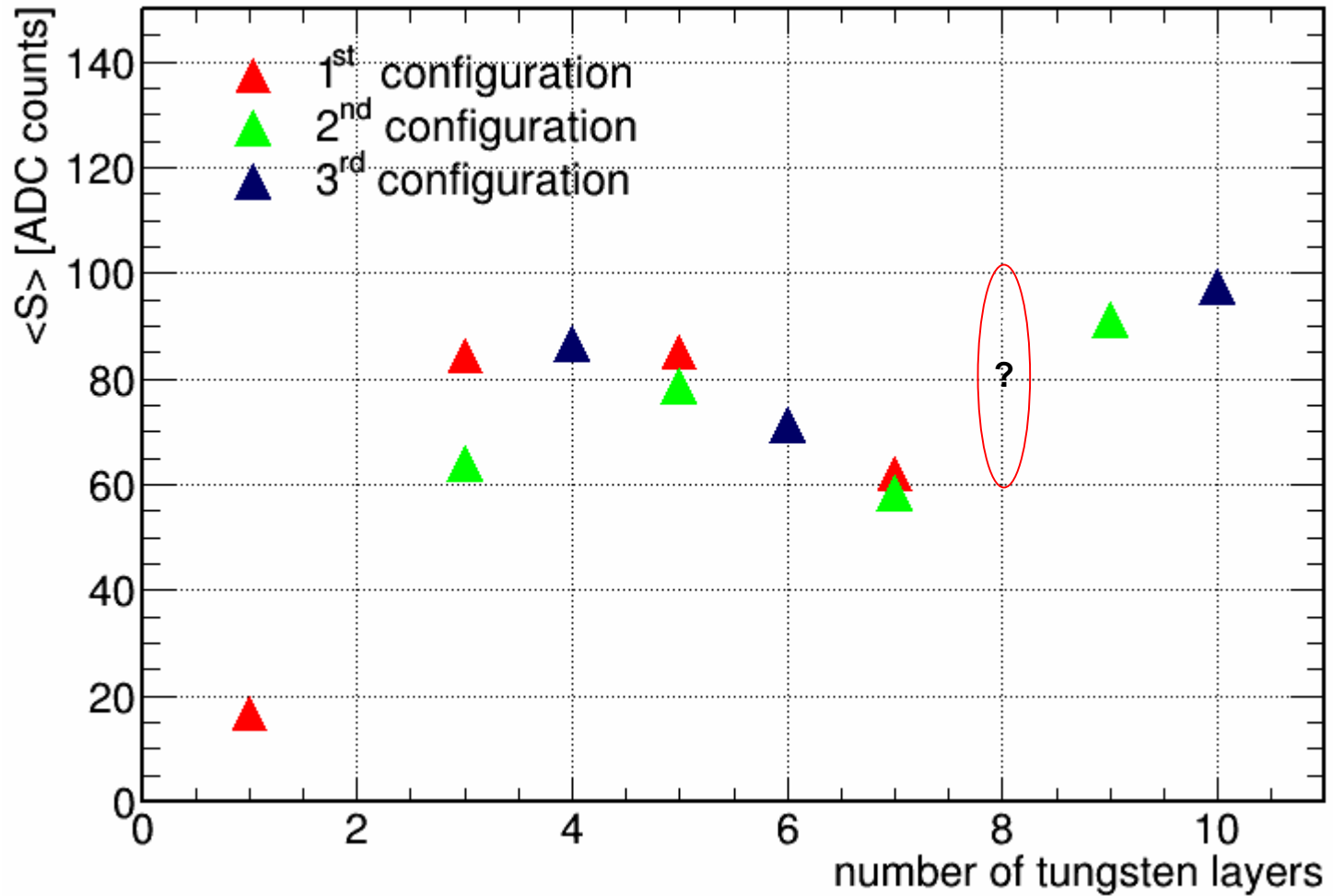
BACK



3rd configuration



3rd LumiCal sensor didn't work!!!

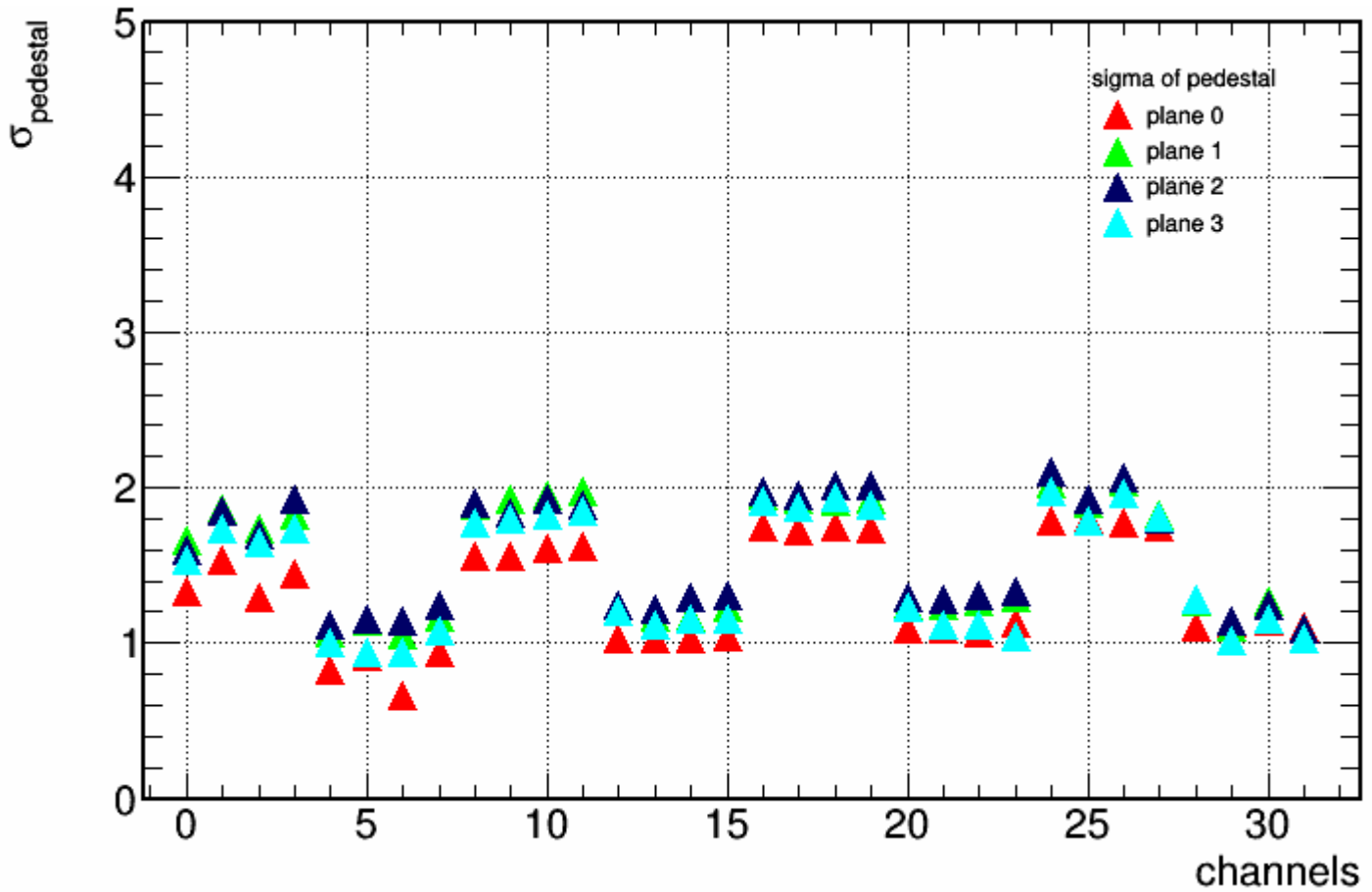


Conclusion



- ✓ Data analysis method was developed;
- ✓ Pedestal was determined from the first 6 samples in each channel;
- ✓ The sigma of the pedestal is in a good agreement with the calibration coefficient;
- ✓ The average value of the signal for all active channels was determined;
- ✓ The shape of the electromagnetic shower is in a good agreement with the electromagnetic shower obtained in the previous testbeam;
- ✓ The hadronic shower has to be validated by GEANT 4 simulation;

THANK YOU FOR ATTENTION!



Acknowledgement



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