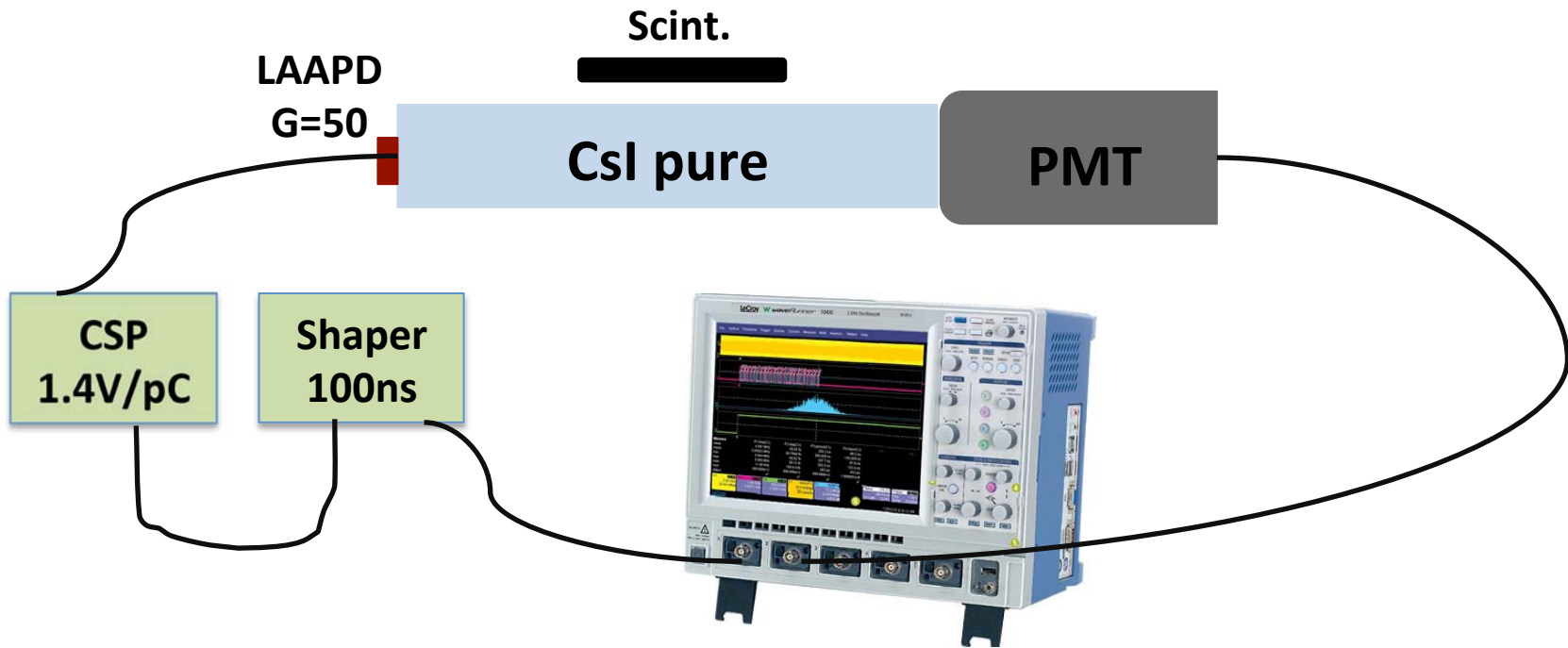


# Csl readout with LAAPD

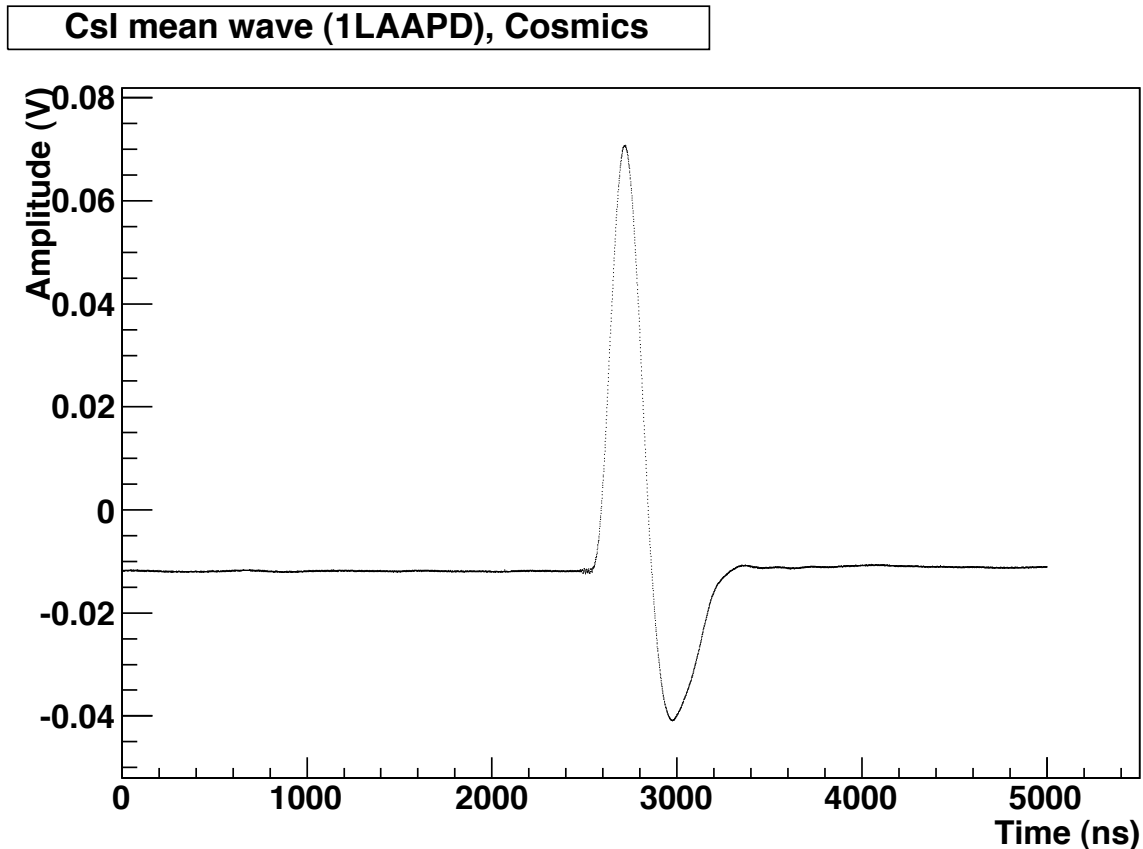
Alessandro Rossi

# SetUp



- Trigger: Scint + PMT coincidence
- Daq:
  - Total Charge from PMT
  - Waveform from LAAPD (5k sample @ 1Ghz)

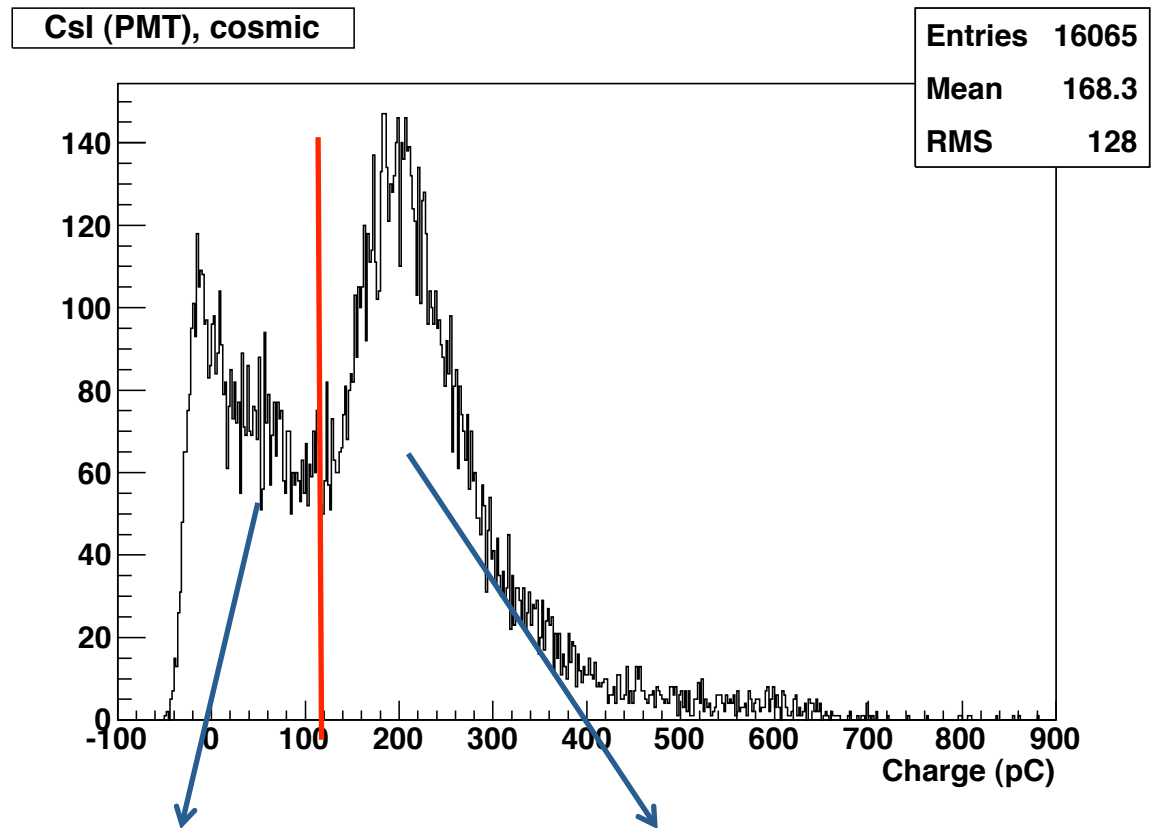
# MeanWave



- A small over shoot
- Mean expected amplitude  $\sim 85\text{mV}$

# Energy deposit : PMT

- Integrated charge on PMT
- Int. window: 500ns

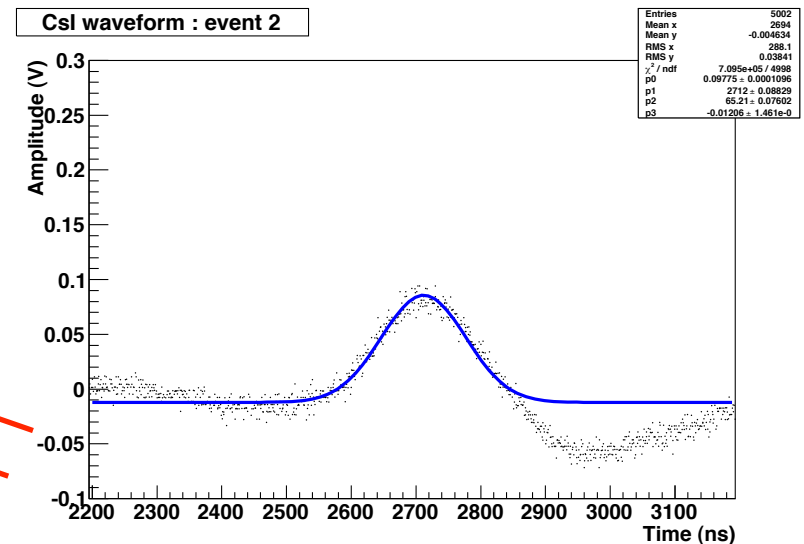
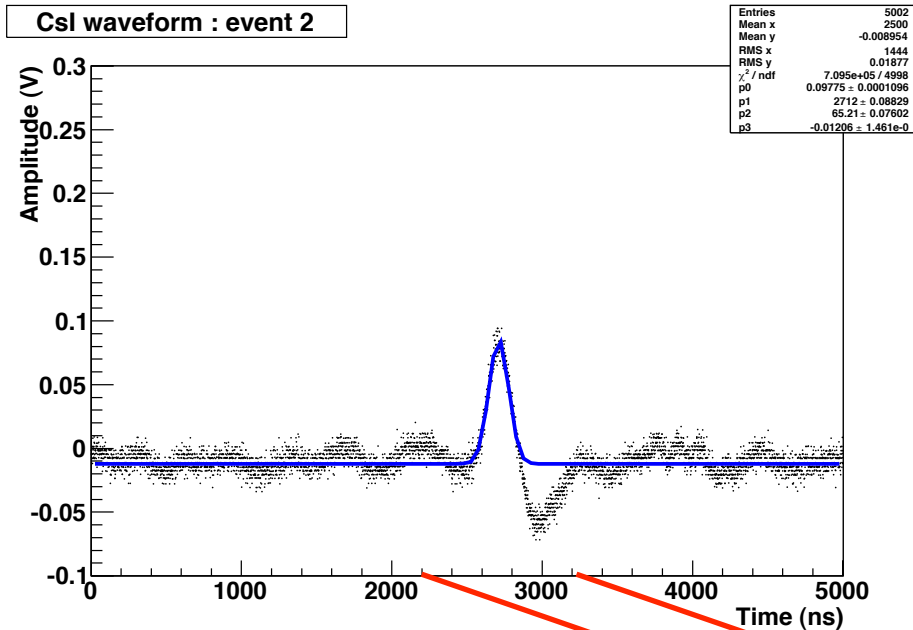


Cosmic did not travel along all crystal

Look at these events

# Maximum Finding

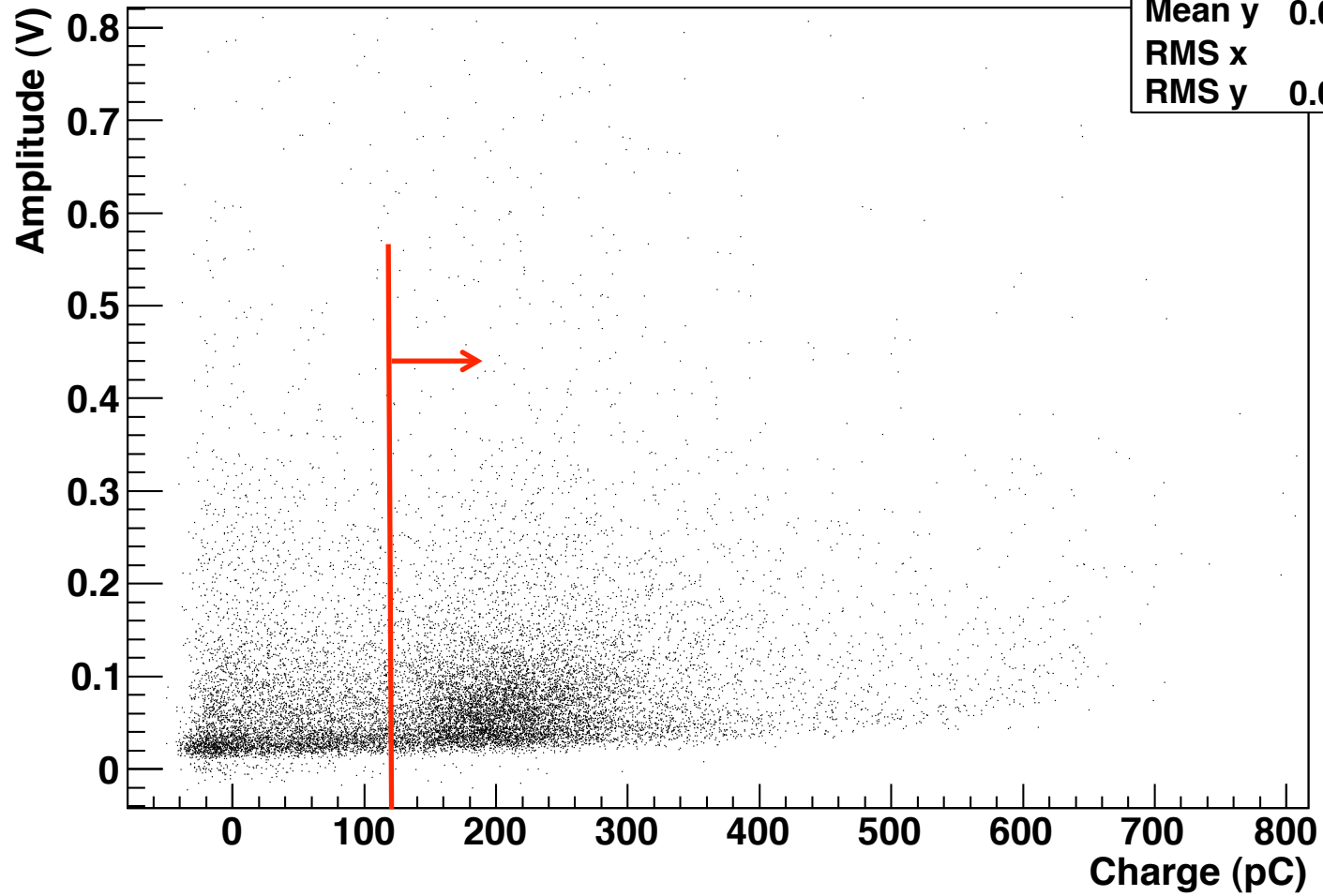
- Fit with gaussian + constant term



# LAAPD vs QPMT

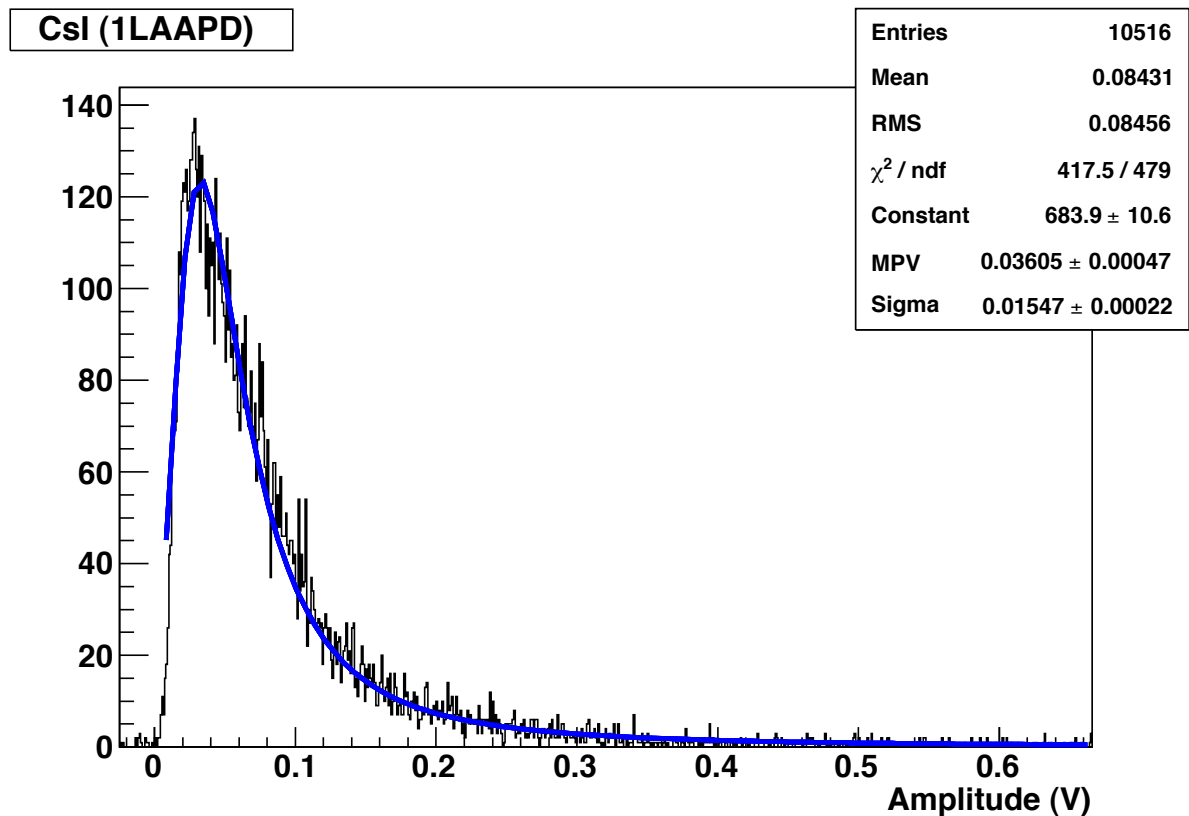
CsI (1LAAPD) : qPMT vs LAAPD amp

Entries	16065
Mean x	168.1
Mean y	0.09186
RMS x	127.6
RMS y	0.09284



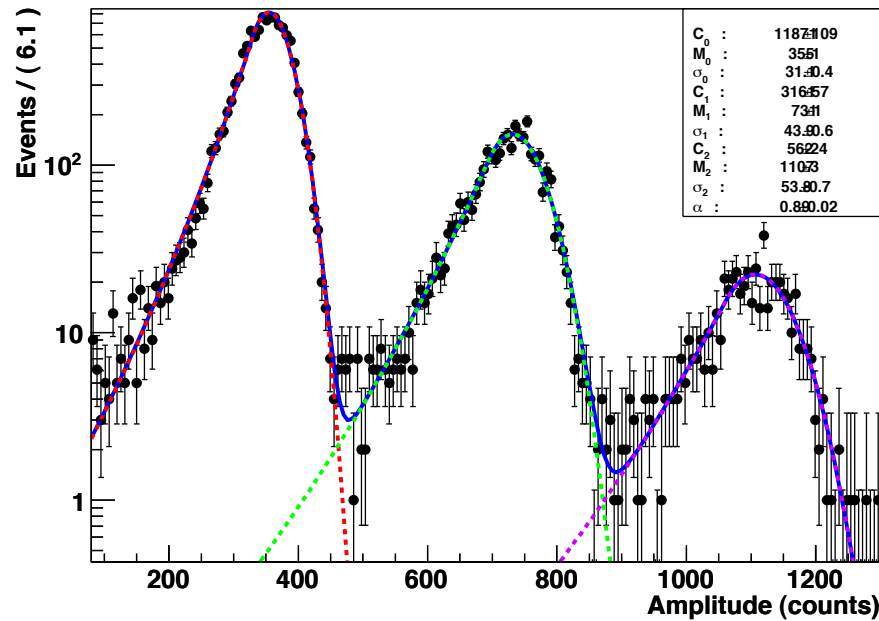
# LAAPD with QPMT selection

- Selected LAAPD events
- $q\text{PMT} > 120\text{pC}$
- MPV: 36mV

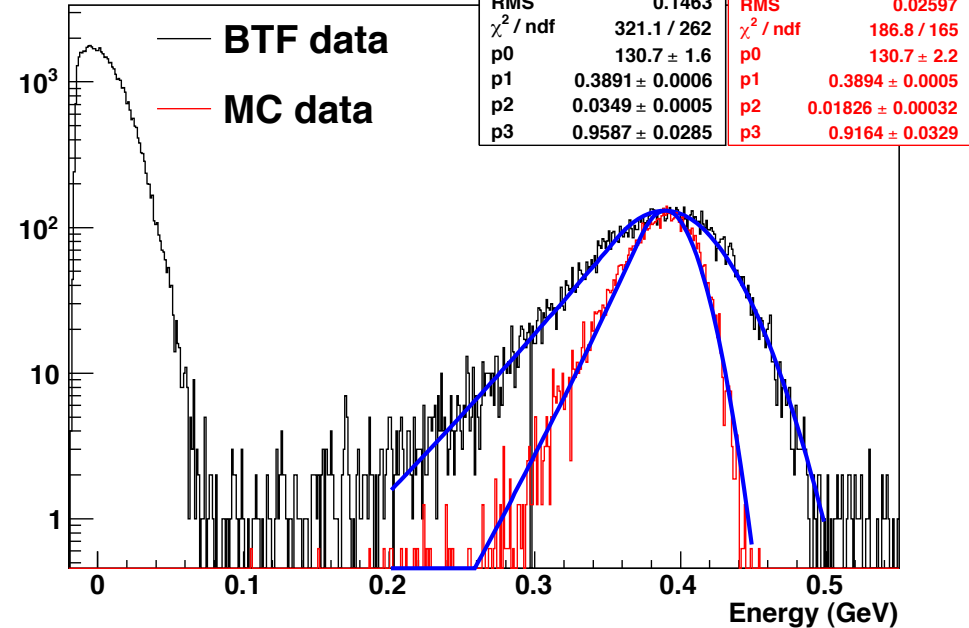


# Naïve Energy Calibration

CsI (1LAAPD) - Beam 486 MeV



Pure CsI with LAAPD - Beam 0.486GeV

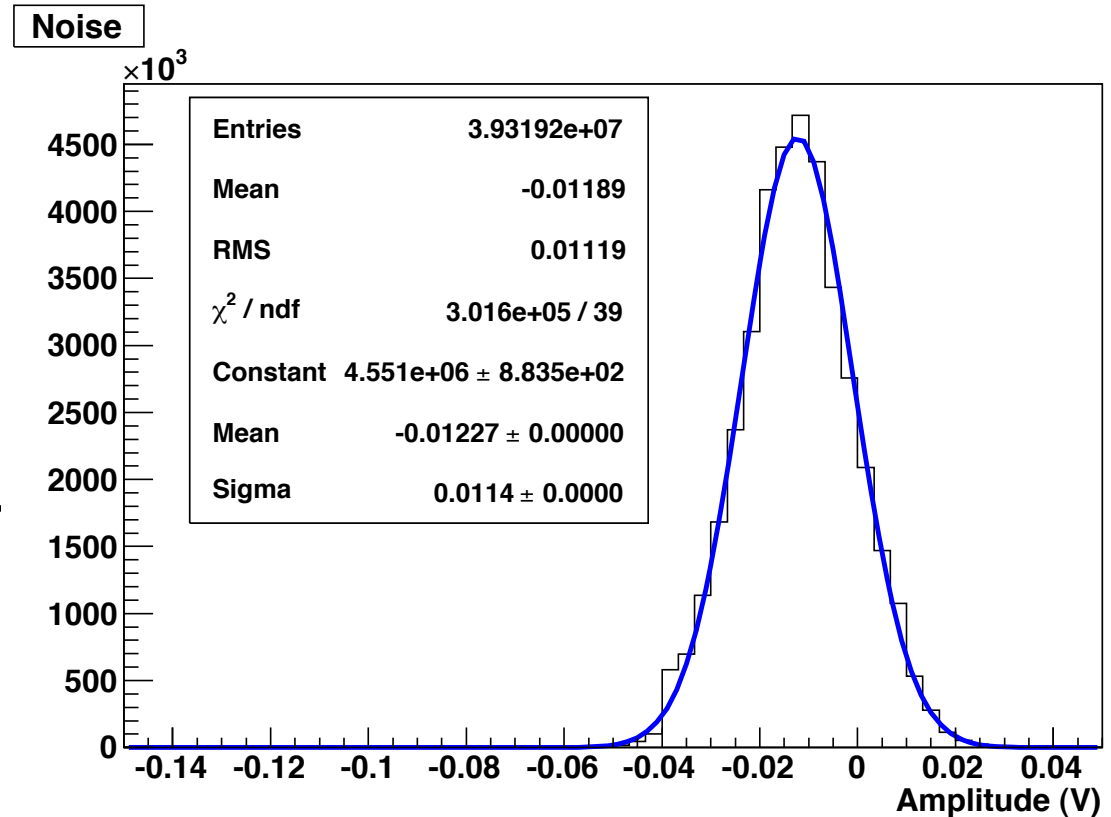


- 1 mV = 1.09 MeV
- With this value cosmic MPV ~  
36\*1.09=39MeV (to check with MC)



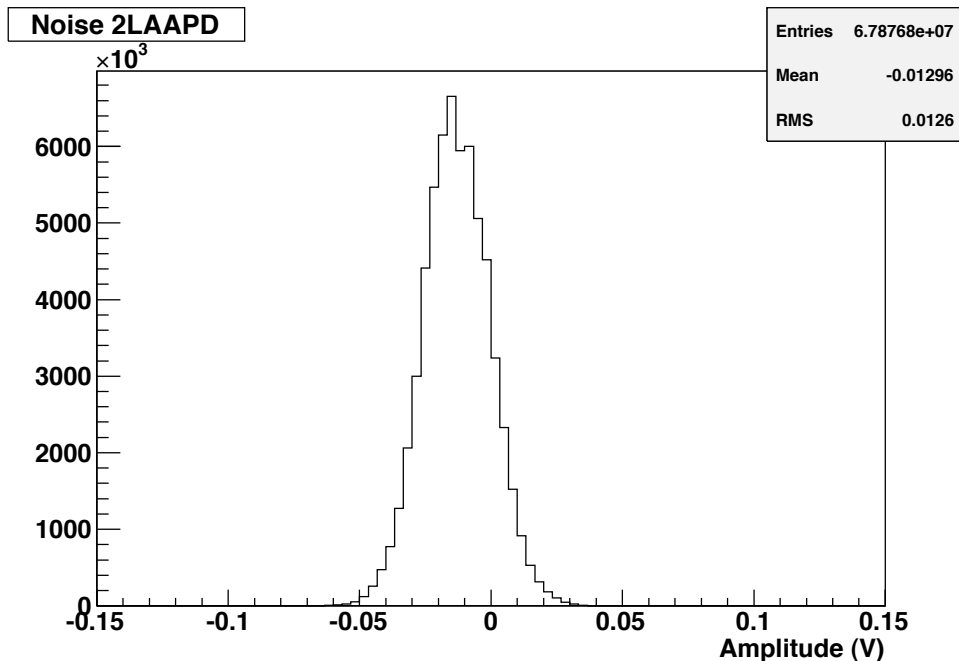
# Noise

- BaseLine RMS  
11.4mV
- S/N for cosmic  
muons:  
 $36/11.4=3.2$
- Noise estimator  
12.4 MeV



# Test with 2 LAAPD

- Two 2 LAAPD glued to the crystal



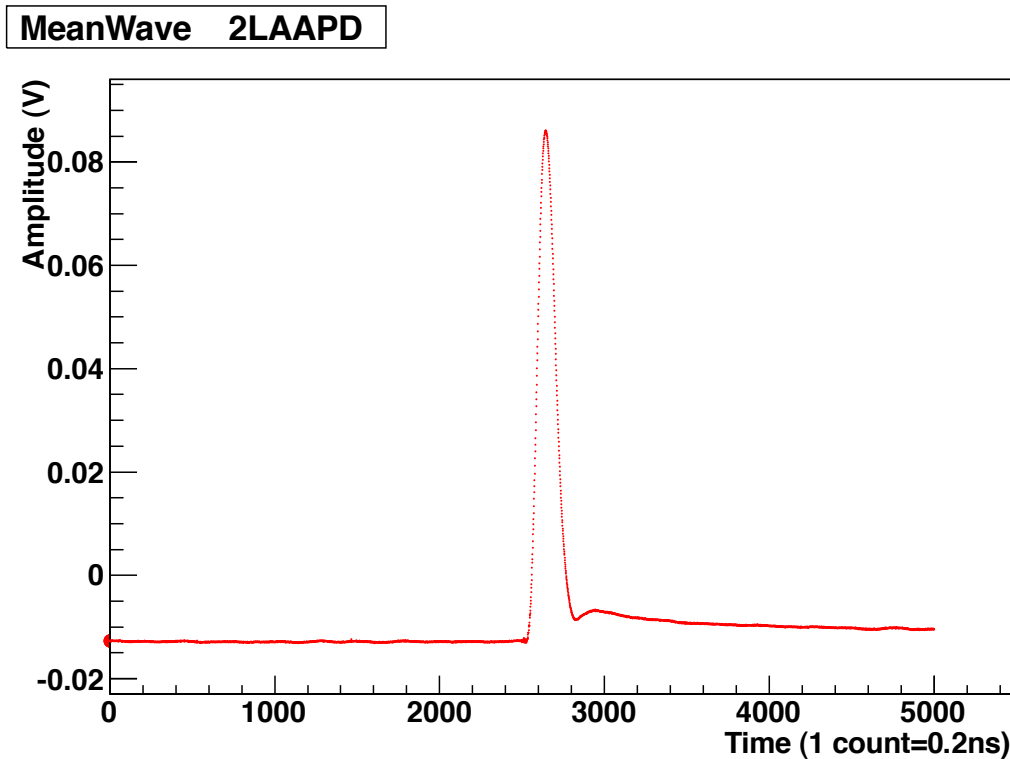
~ same level of  
1LAAPD noise

- 11.4 mV (1LAAPD)
- 12.6 mV (2LAAPD)

- Oscilloscope ADC only 8bit
- In this case Osc. Resolution  $\sim 2\text{mV}$
- Need to check the effect by change the dynamic range

# Test with 2 LAAPD

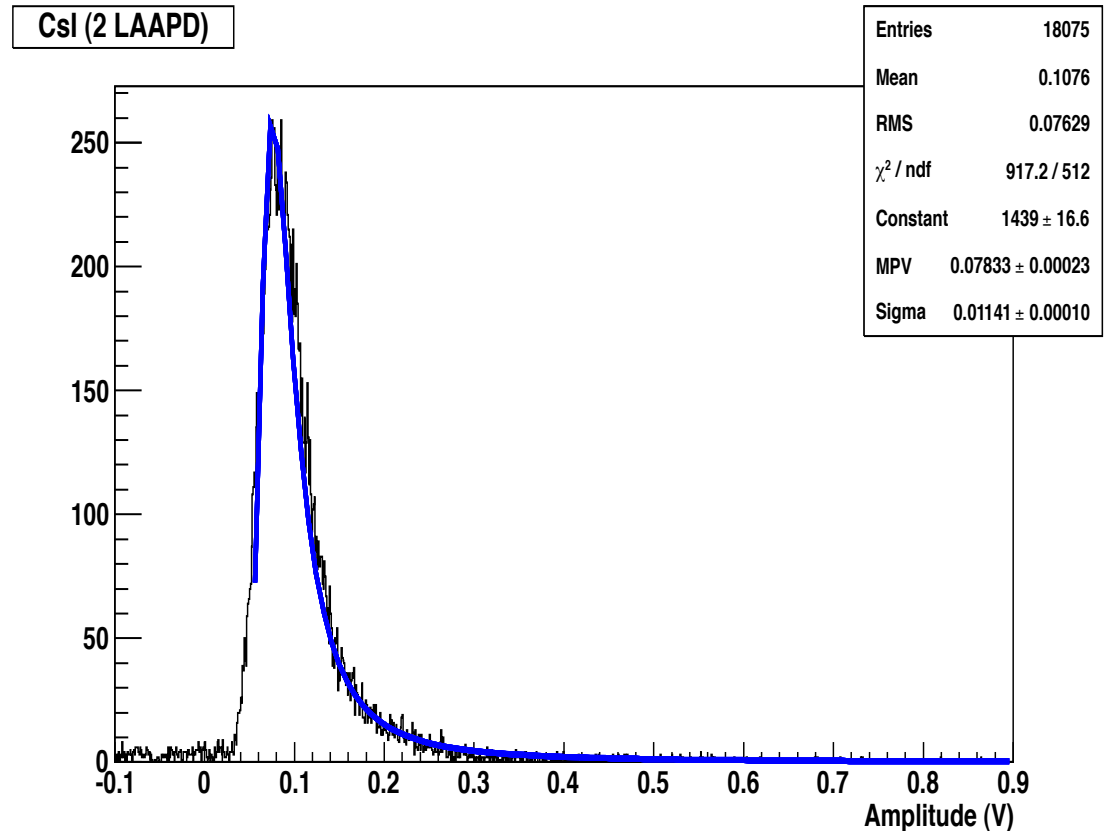
- Expected to have a x2 signal



- Mean Amplitude : 0.105mV
- $2LAAPD / 1LAAPD = 0.105 / 0.085 = 1.2$

# Test with 2LAAPD

- MVP : 78 mV
- x2.1 1LAAPD
- Noise =  
 $12.6\text{mV} * 1.09 / 2$   
 $.1 = 6.6\text{MeV}$   
– Still too high



# Conclusion

- Very preliminary results
- Need to check calibration results with MC and other methods (i.e. rad. Source)
- Noise level of the order of 12 MeV with 1LAAPD and 6.6MeV with 2LAAPD
- Need to check the effect of limited oscilloscope resolution on the noise evaluation