

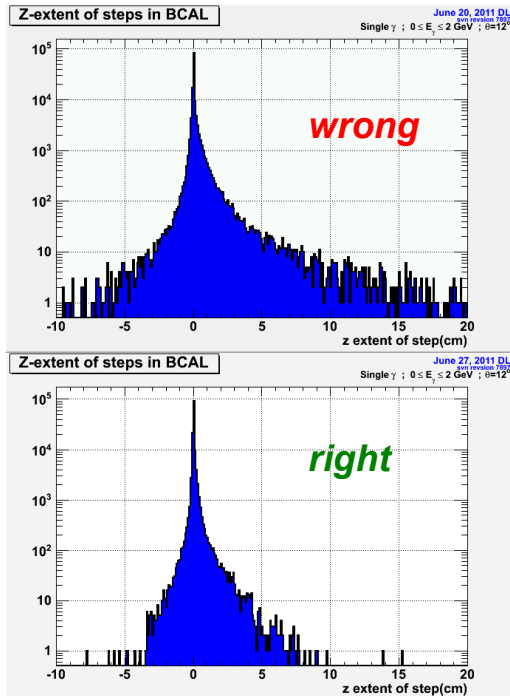
# BCAL Signal Timing Distributions

David Lawrence JLab

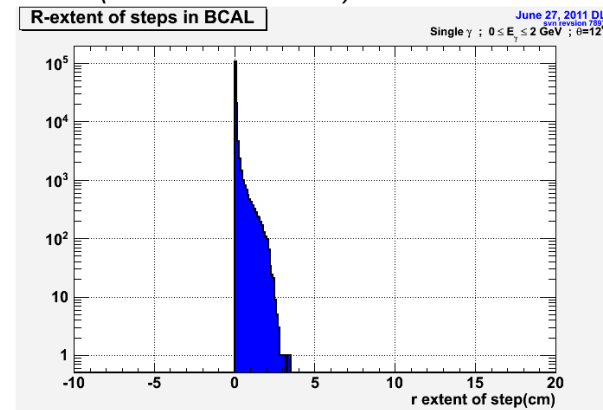
June 30, 2011

# Step size in radial direction

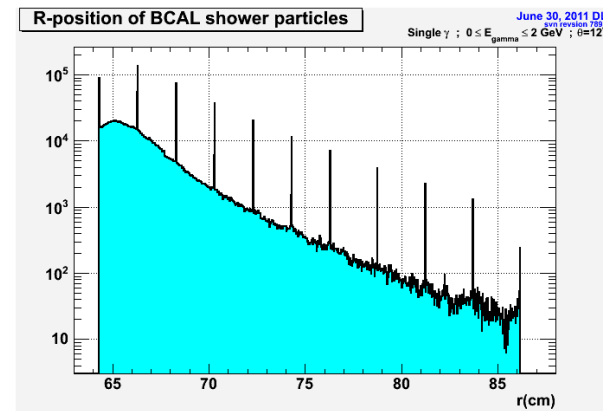
Correction: z-projection of steps shown last week were miscalculated indicating they were slightly larger than what they should have been



R-projection of steps is contained to cell size (2.0cm to ~3.4cm)



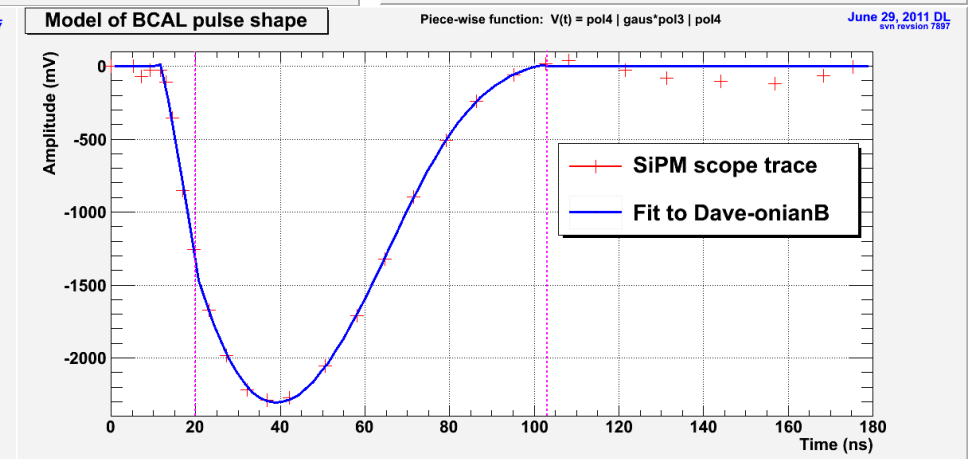
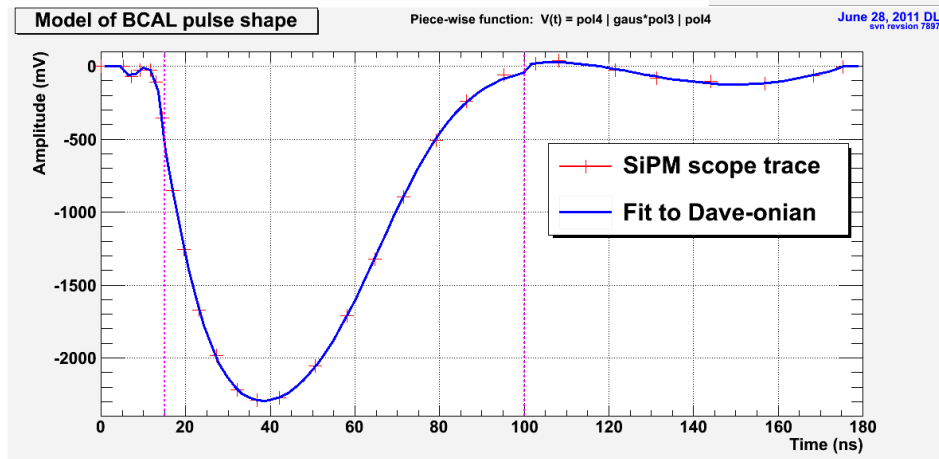
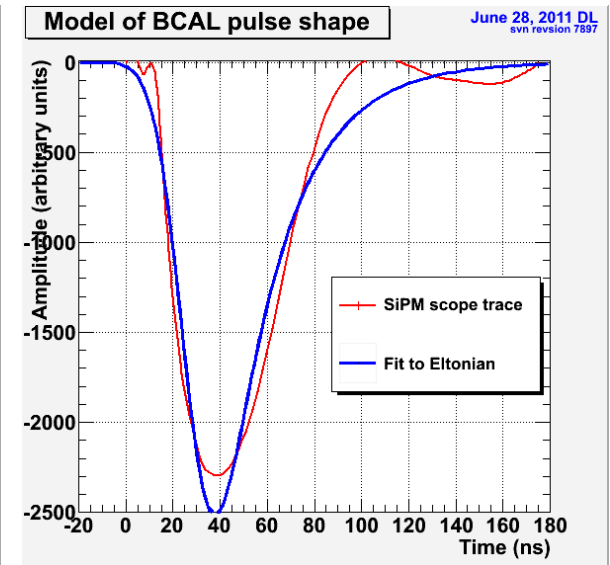
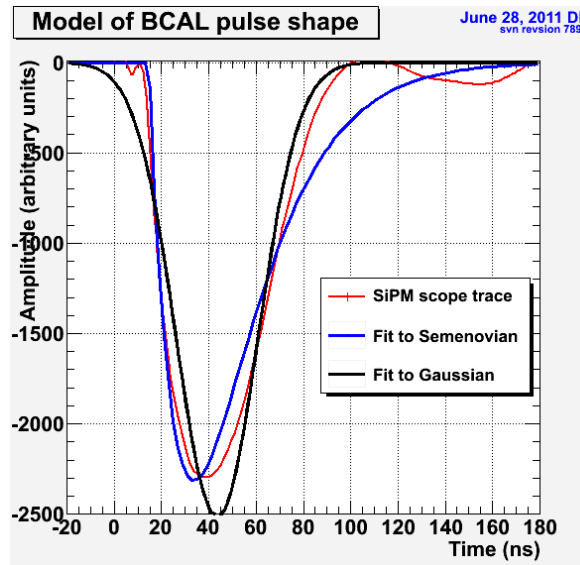
R-boundaries can be seen easily in step positions



# SiPM pulse shape

Fernando provided an image of a scope trace of a SiPM pulse. Several functional forms were used to try and fit the shape.

Eventually, one was used that cuts out both the pre and after pulses (bottom right)



# Relating MeV to Signal Amplitude

From CalibDB

75 photons/side/MeV in fiber  
0.21 PDE  
0.095 Sampling fraction

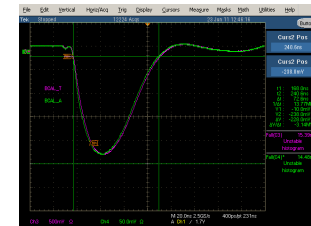
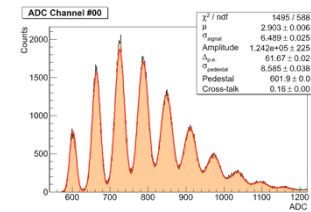
0.668 MeV/PE

61.67 QCD counts/PE  
CAEN V792 QCD: 100fC LSB

9.23 pC/MeV

SiPM pulse shape:  
1.20 nC for 2.293V peak

17.6 mV/MeV



# Discriminator Thresholds

Convert effective thresholds in MeV from June 2<sup>nd</sup> presentation to electronic thresholds in mV that can be applied to signal distributions.

Effective thresholds

	<b>inner</b>	<b>outer</b>
fine (near)	<b>2.3 MeV</b>	<b>2.3 MeV</b>
fine (far)	<b>8.4 MeV</b>	<b>8.4 MeV</b>
course (near)	<b>2.4 MeV</b>	<b>2.6 MeV</b>
course (far)	<b>8.8 MeV</b>	<b>9.5 MeV</b>

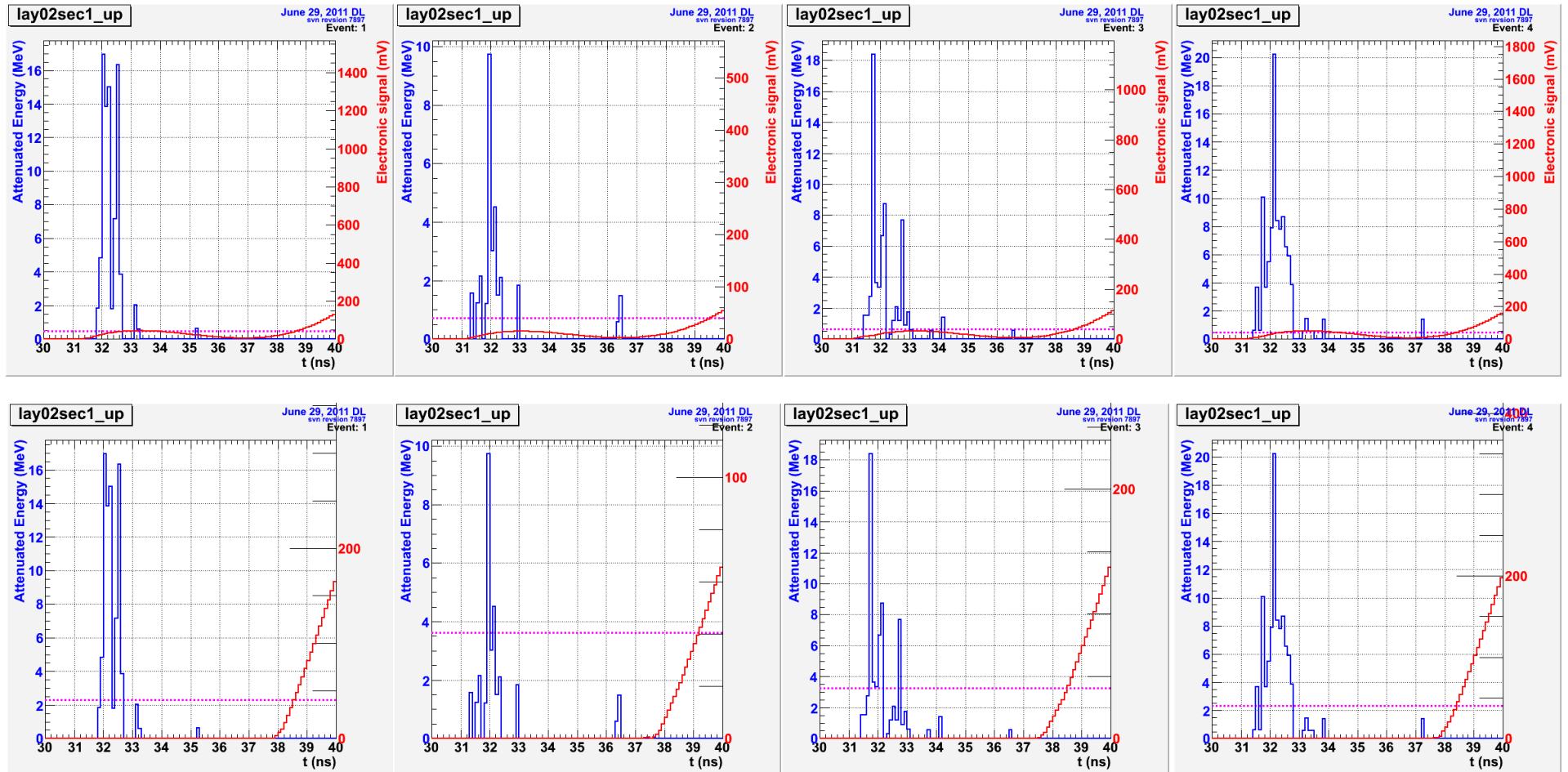


	<b>inner</b>	<b>outer</b>
fine	40.5 mV	40.5 mV
course	42.2 mV	45.8 mV

*from June 2<sup>nd</sup> presentation*

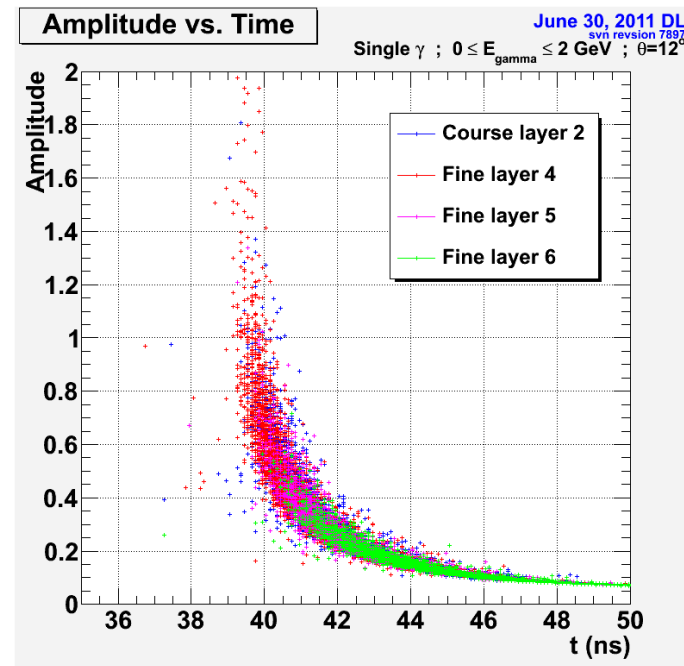
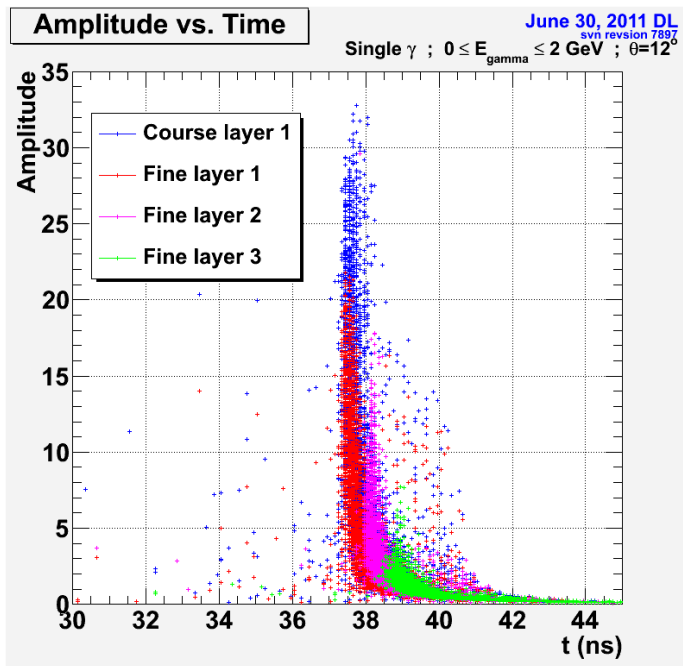
# Applying Threshold

- Top plots include pre-pulse in pulse shape representation, bottom ones do not.
- Single cells shown for first 4 events (sampled from  $0 < E < 2\text{GeV}$  @  $12^\circ$ )
- Electronic signal is plotted vs. right axis.



# Amplitude vs. Discriminator Time

Plots here are for one sector  
Generated particles distributed evenly over  $\phi$



# Still to Do ...

- Add in Dark hits
- Improve leading edge of pulse shape?
- Timewalk correction
- Reconstruction to get shower position
  - Optimize TRMS in KLOE for both fine and course segmentation schemes

*Realistically, these tasks will take 3-4 weeks minimum (+1 week due to my being on vacation next week). This would push segmentation decision back to first week of August at the earliest.*

*How to proceed?*