First Pulse Shapes for the Comparison Method

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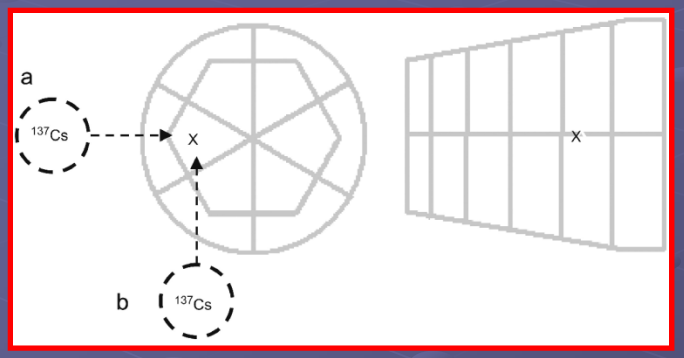
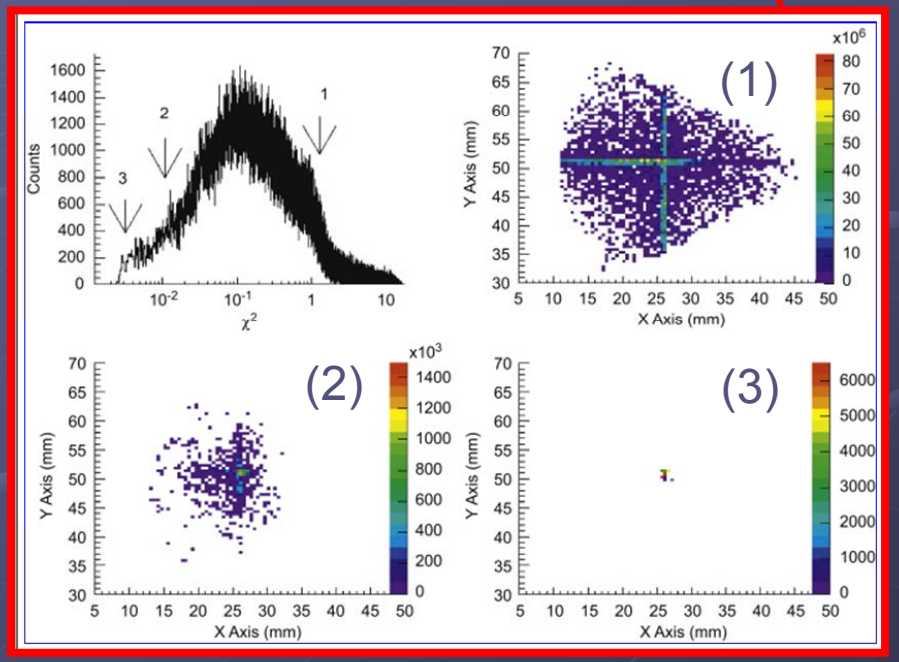
Pulse Shape Comparison based Scan (PSCS)

The more stringent the χ^2 threshold is set
(i.e. the more the signal shapes are similar), the more the energy release is concentrated in the position of interest





The PSCS method has been already validated with simulated data (segmented HPGe detector) and succesfully applied in an experiment with a coaxial non segmented HPGe. *(F.C.L. Crespi et al., NIMA* **593** (2008), p. 440)

The aim of the present work is to validate experimentally the PSCS with an AGATA detector by comparing the results obtained with those extracted using the standard technique (i. e. coincidence scan):
2 singles scan measures with perpendicular collimation lines are needed

C001 data taken in Liverpool *** :

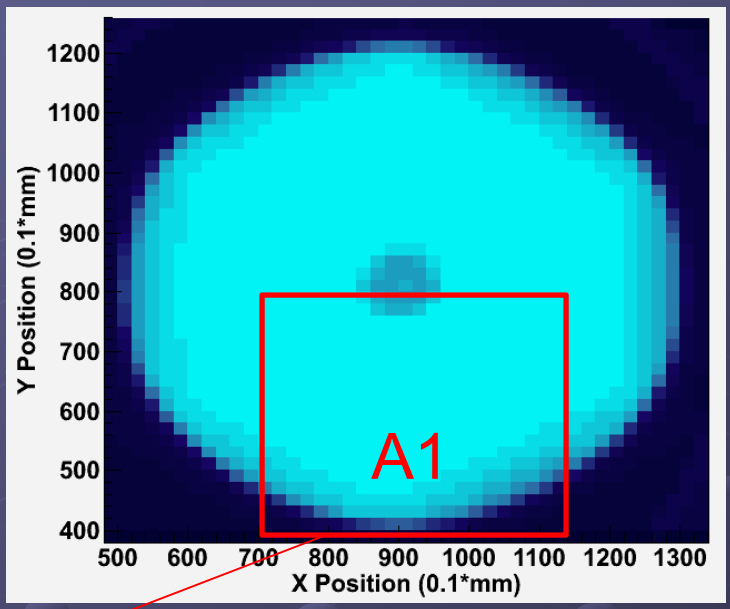
1) Front Face Singles Scan

- 137Cs source collimated to 1mm swept across Front face of the detector

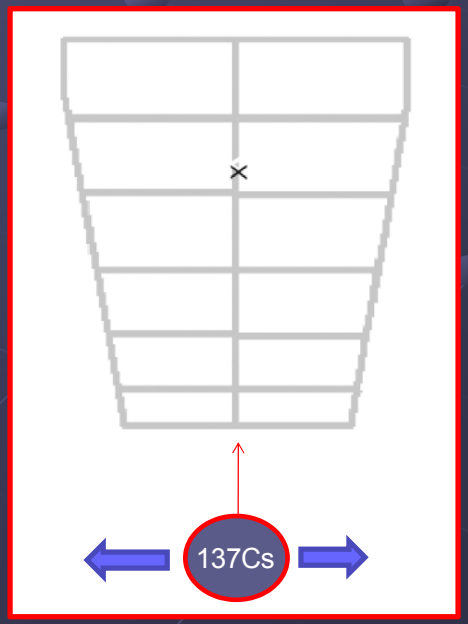
Step Lenght = 1 mm
Step Duration = 60 s
X-start 48 mm, X-range 86 mm
Y-start 39 mm, Y-range 86 mm

-Traces of 128 samples digitized at 100 MHz

- The trigger was generated through a CFD on the core with a threshold of ~300 keV



For the present tests only signals from the A1 segment as been considered



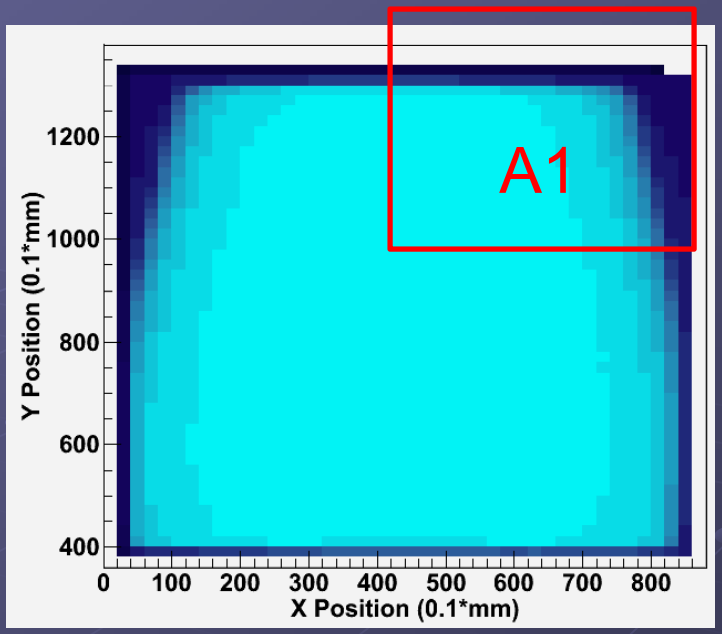
*** all informations from C. Unsworth report

C001 data taken in Liverpool *** :

2) Side Singles Scan Data

- 137Cs source collimated to 1mm swept across Side face of the detector

Step Lenght = 1 mm
Step Duration = 30 s
X-start 3 mm, X-range 82 mm
Y-start 38 mm, Y-range 95 mm

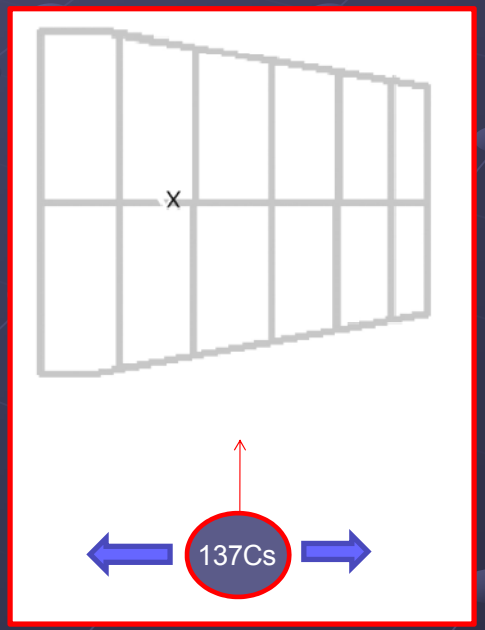


3) Higher Statistics Side Singles Scan Data

- 137Cs source collimated to 1mm swept across Side face of the detector (Step Dur. = 150s) (performed only for 2 detector rings)

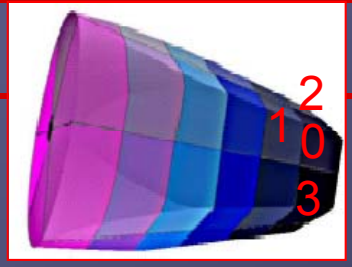
4) Planar Singles Scan Data

-137Cs source collimated to 1.5 mm thick plane

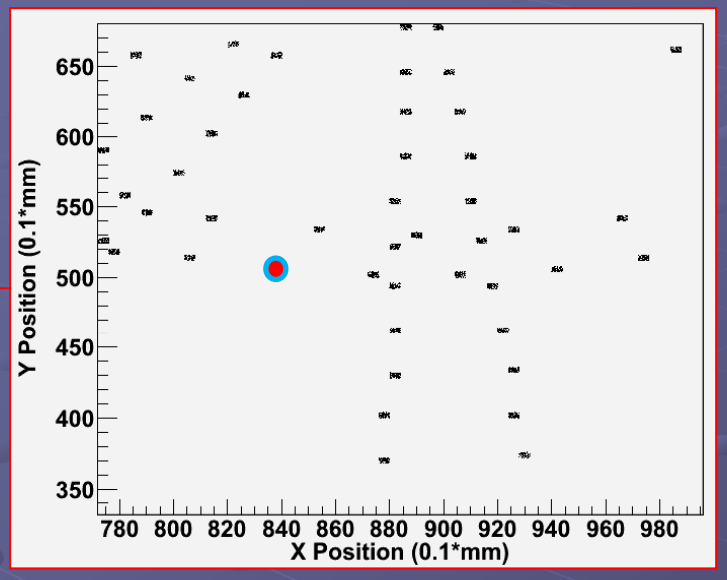


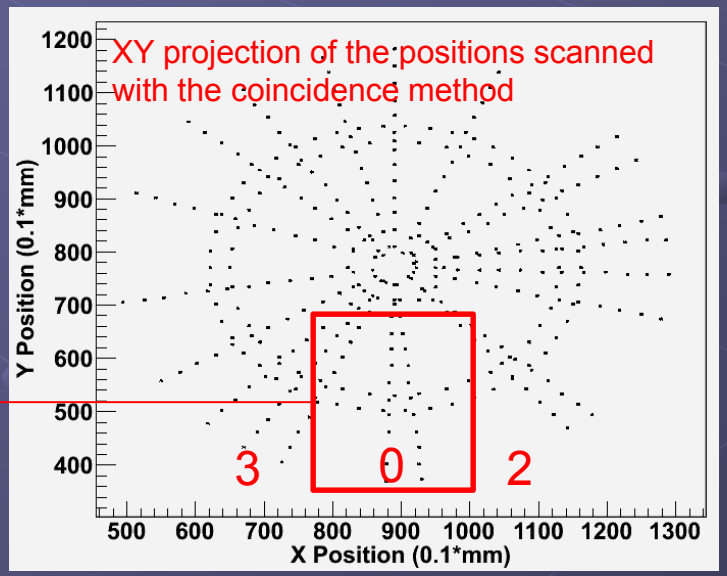
I produced "presorted" datasets for 1) and 2) in which only the events with A1 firing AND segment multiplycity = 1 have been selected. Furthermore the traces have been normalized and time-aligned to be ready for applying the comparison procedure.

A Simple Test



Before applying the PSCS, a simple test for checking consistency of datasets.
The coincidence scan traces are compared with the front face singles scan ones.
The X and Y coorindates have to be the same for identical shapes.

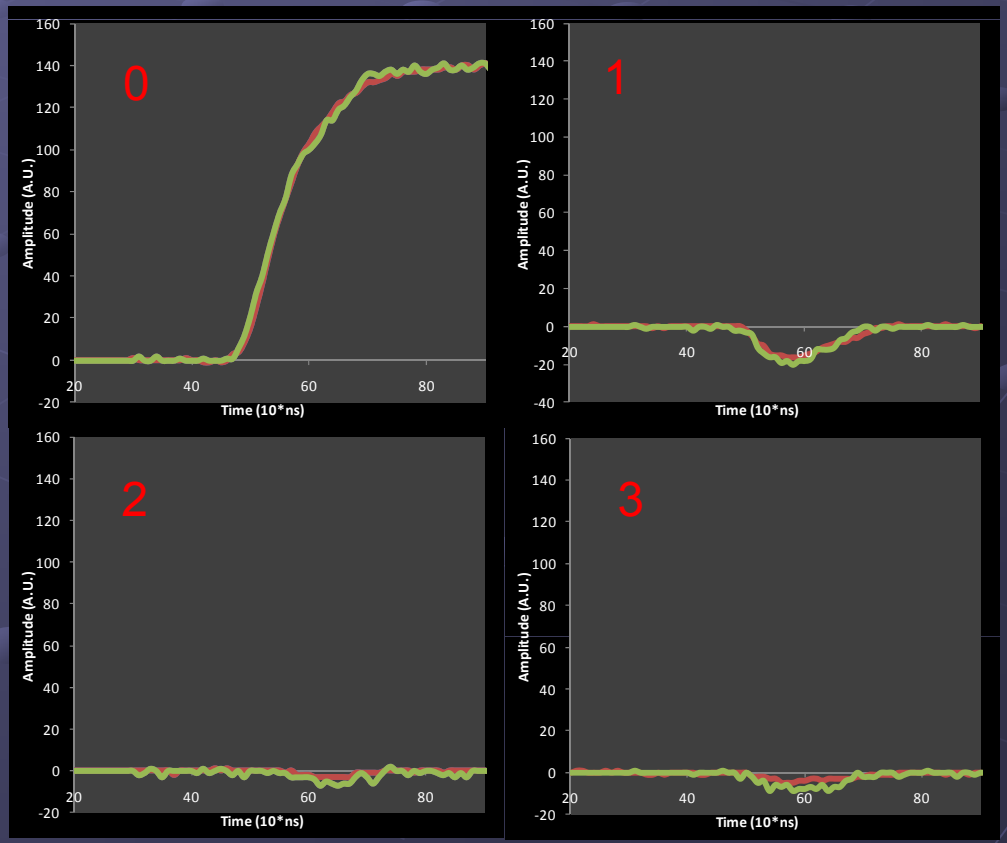




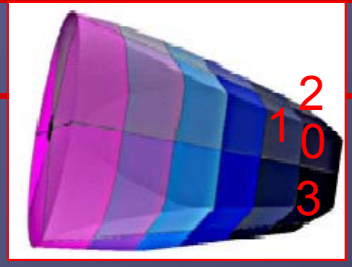
Pos X 840 (0.1*mm), Pos Y 510 (0.1*mm), Pos Z 50.5 (0.1*mm)

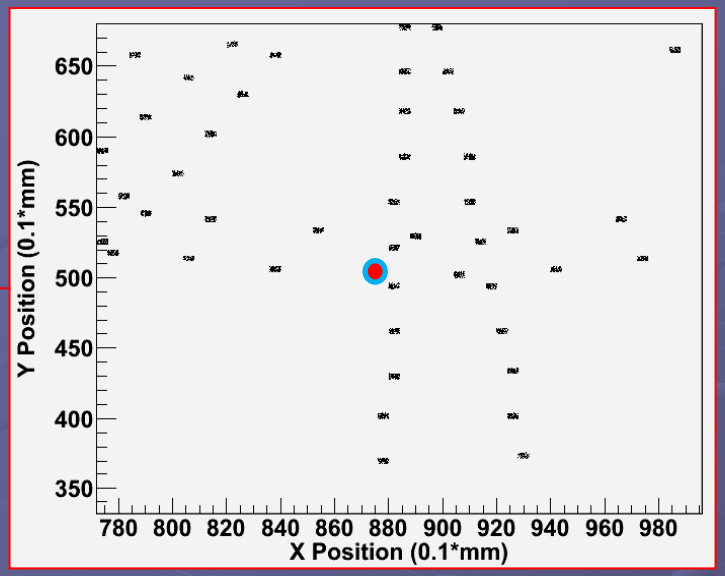
Front Face Singles Scan Data

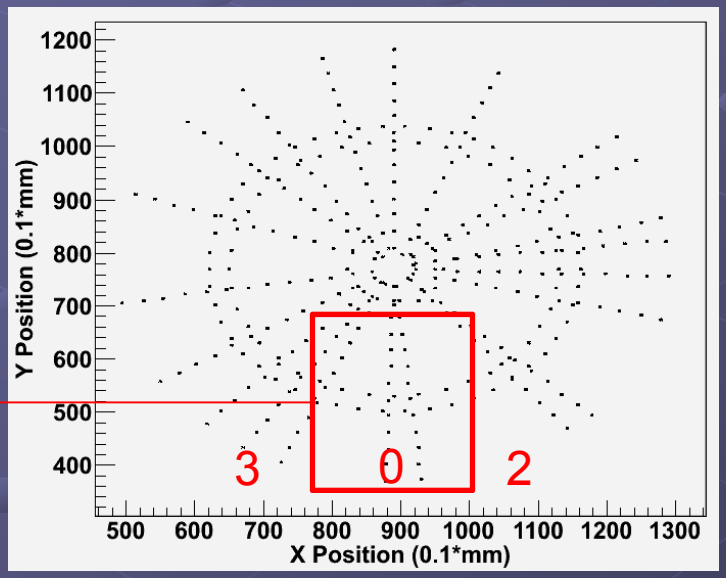
Coincidence Scan Data



A Simple Test



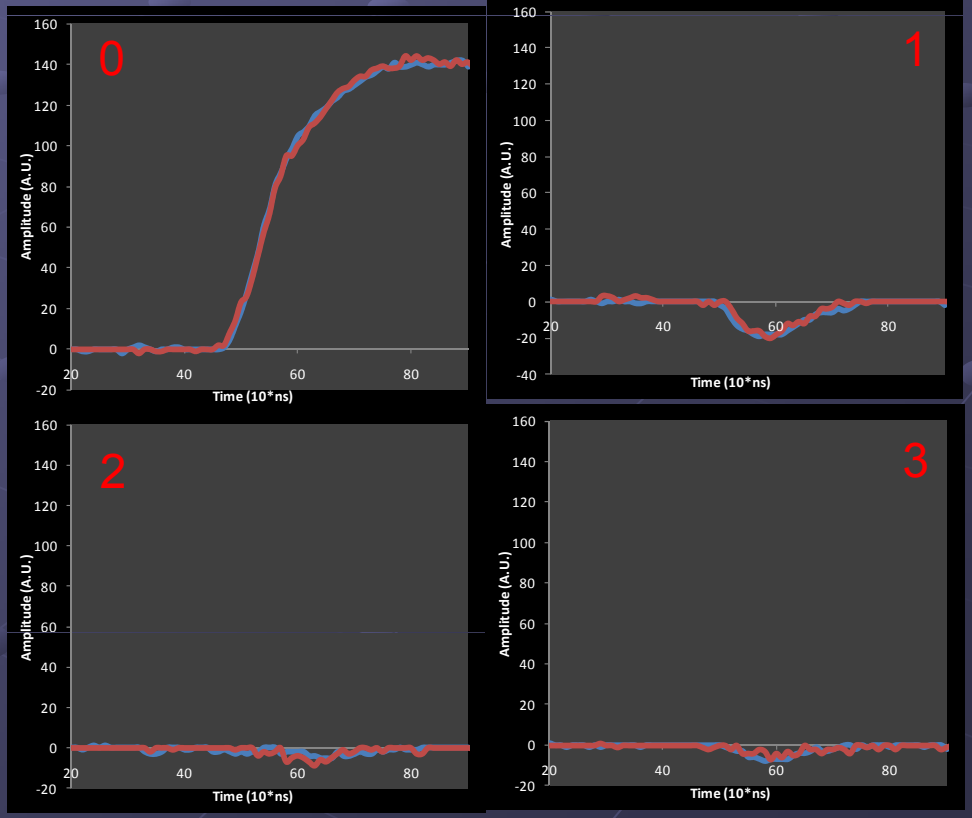




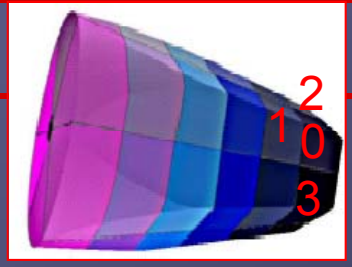
Pos X 880 (0.1*mm), Pos Y 500 (0.1*mm), Pos Z 50.5 (0.1*mm)

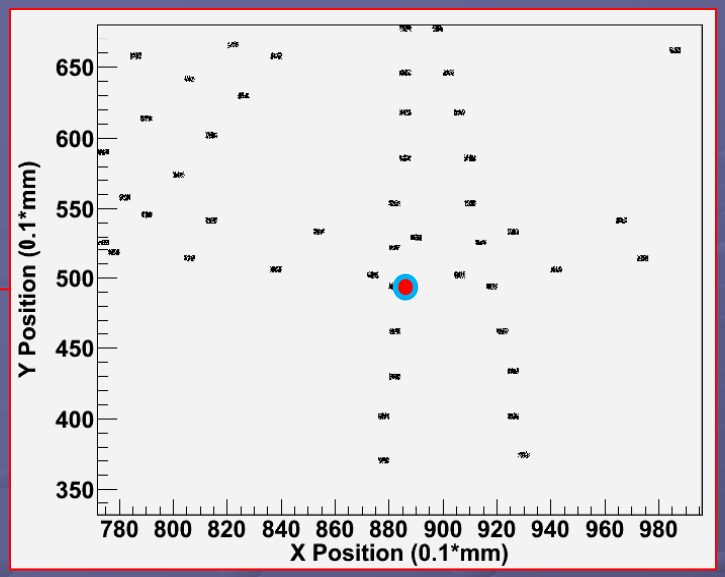
Front Face Singles Scan Data

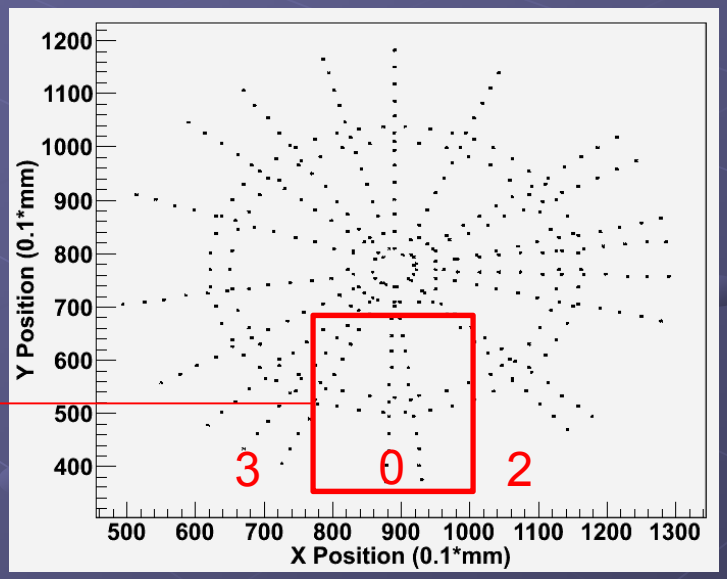
Coincidence Scan Data



A Simple Test



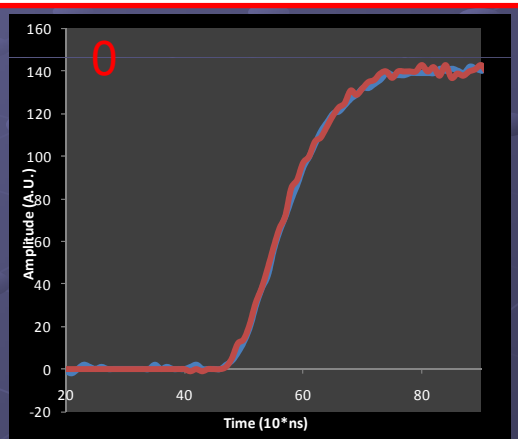


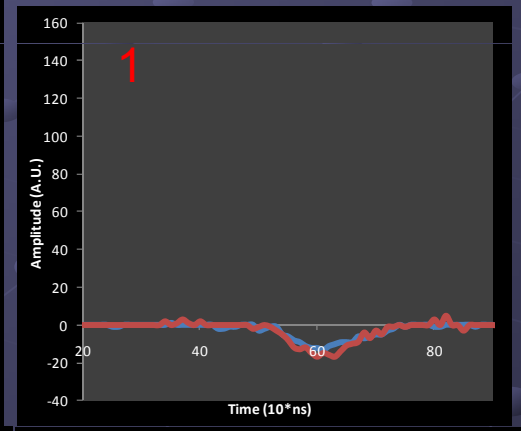


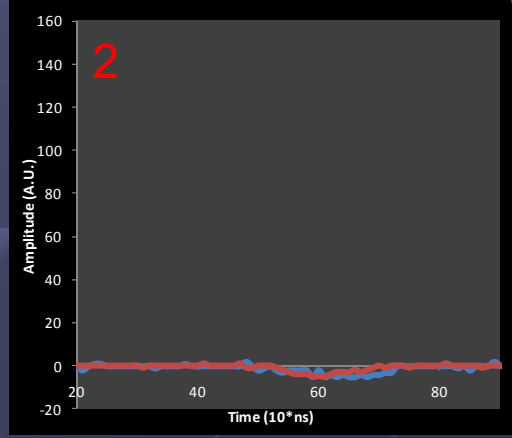
Pos X	Pos Y	Pos Z
890 (0.1*mm),	490 (0.1*mm),	50.5 (0.1*mm)

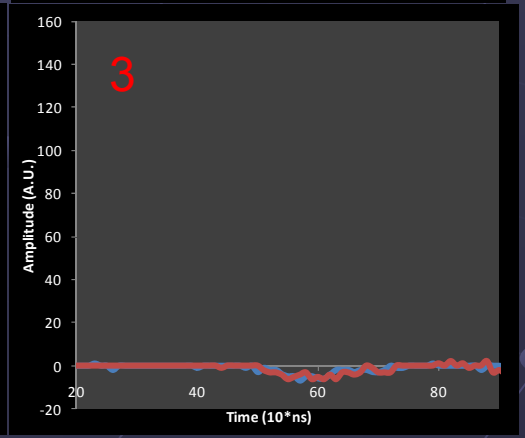
Front Face Singles Scan Data

Coincidence Scan Data

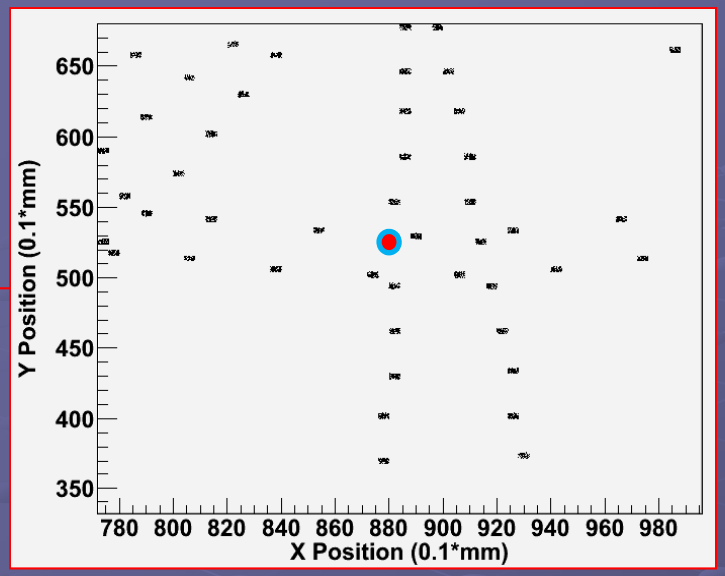


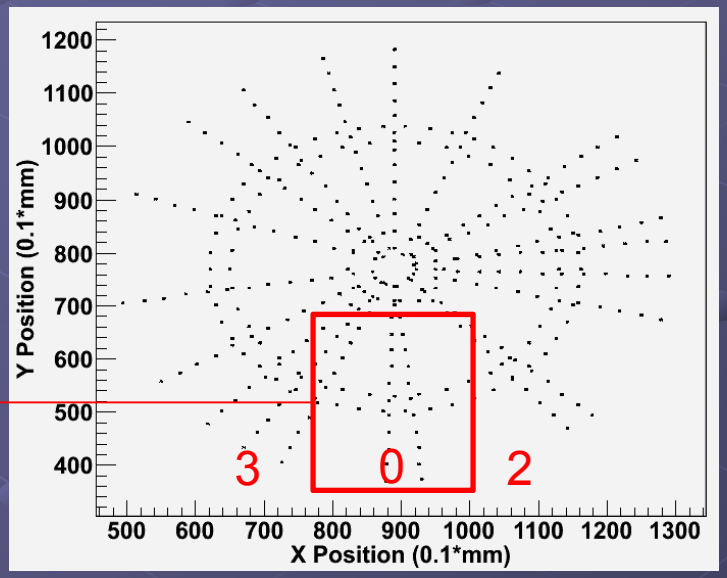






A Simple Test

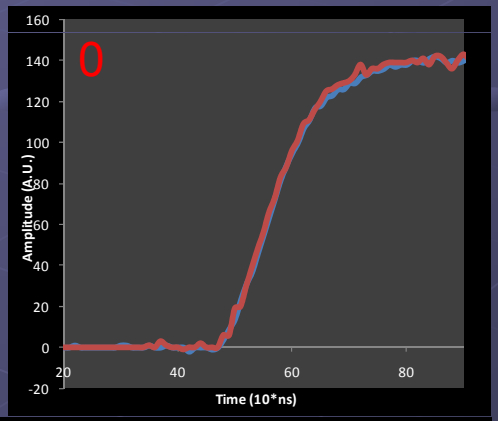


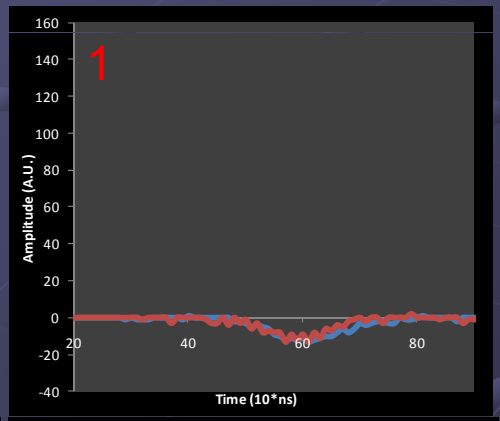


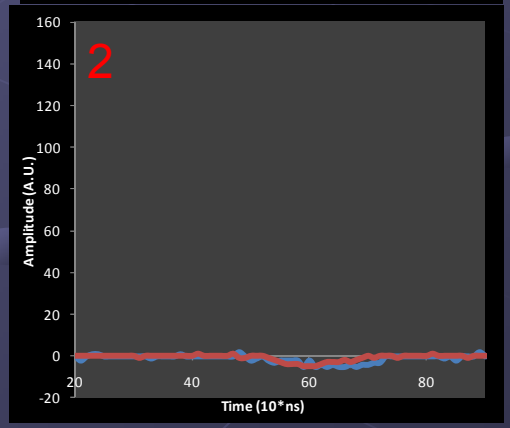
Pos X	Pos Y	Pos Z
880 (0.1*mm),	520 (0.1*mm),	50.5 (0.1*mm)

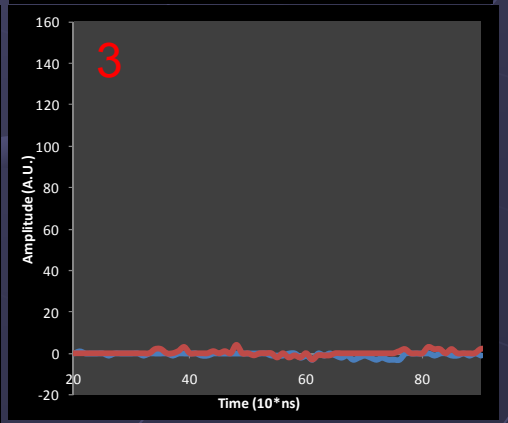
Front Face Singles Scan Data

Coincidence Scan Data

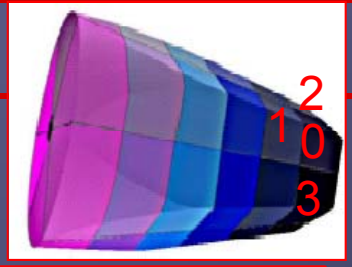


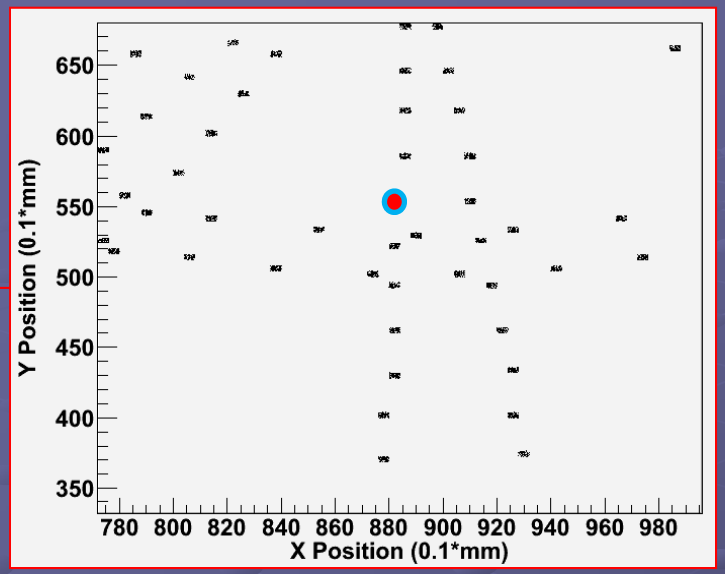


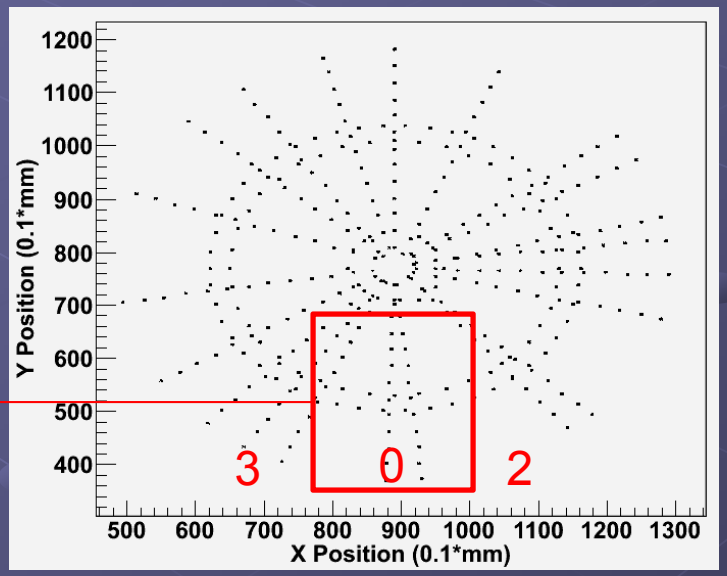




A Simple Test



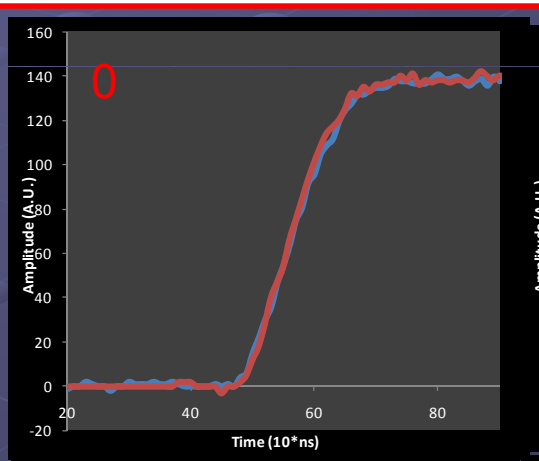


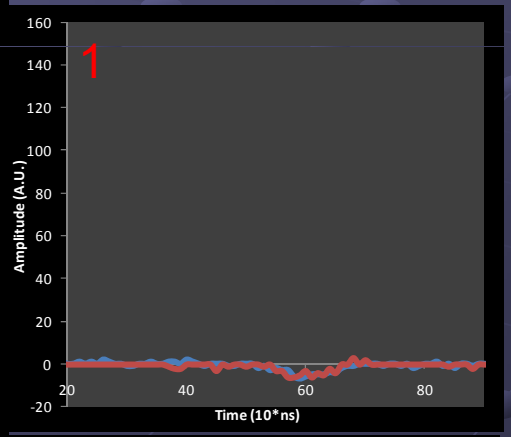


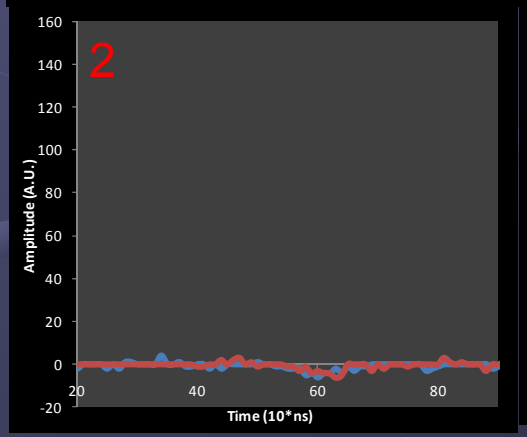
Pos X	Pos Y	Pos Z
880 (0.1*mm),	550 (0.1*mm),	50.5 (0.1*mm)

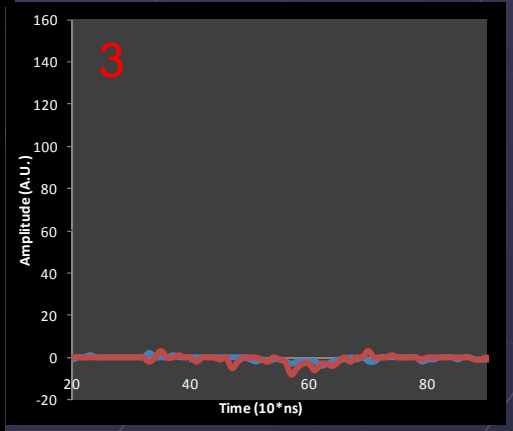
Front Face Singles Scan Data

Coincidence Scan Data

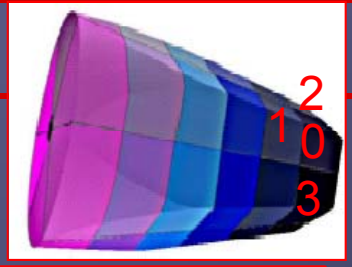


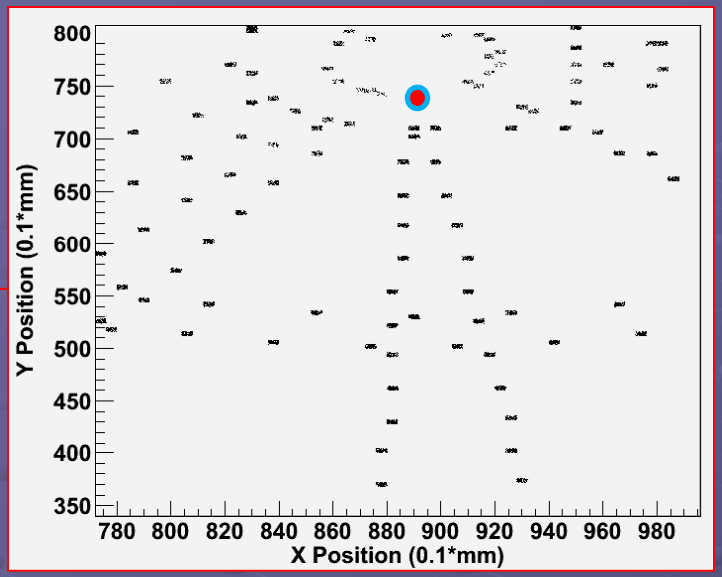


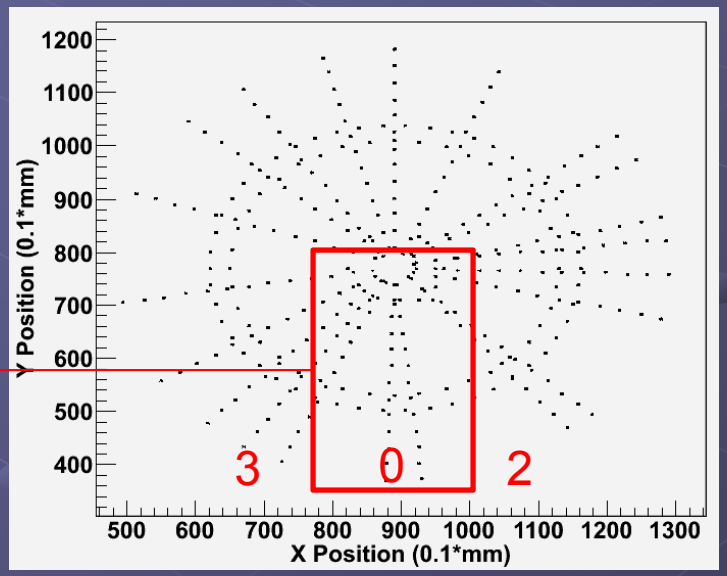




A Simple Test



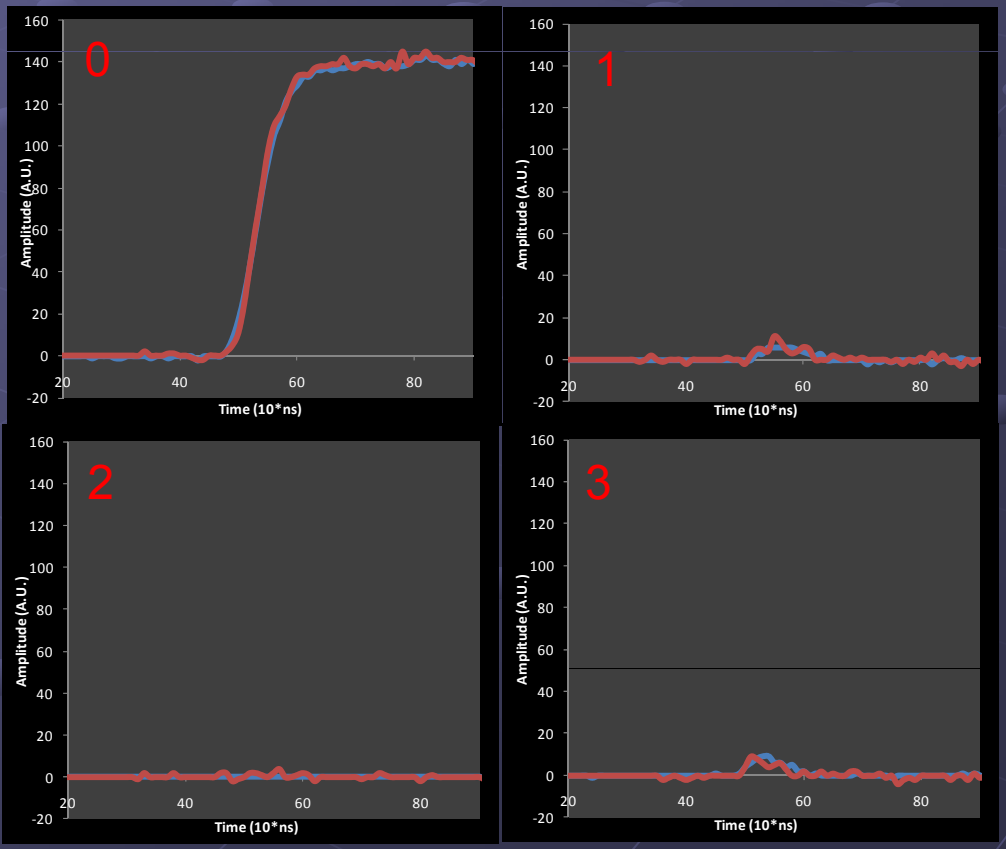




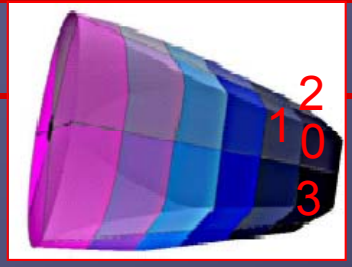
Pos X	Pos Y	Pos Z
890 (0.1*mm),	740 (0.1*mm),	50.5 (0.1*mm)

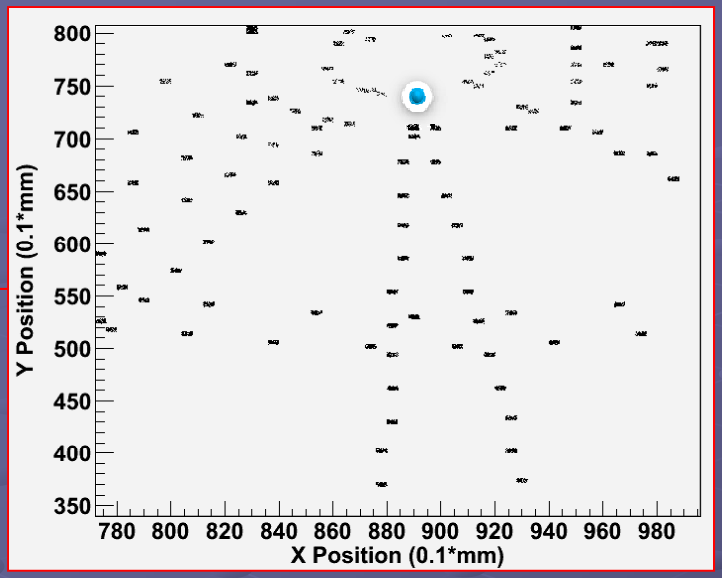
Front Face Singles Scan Data

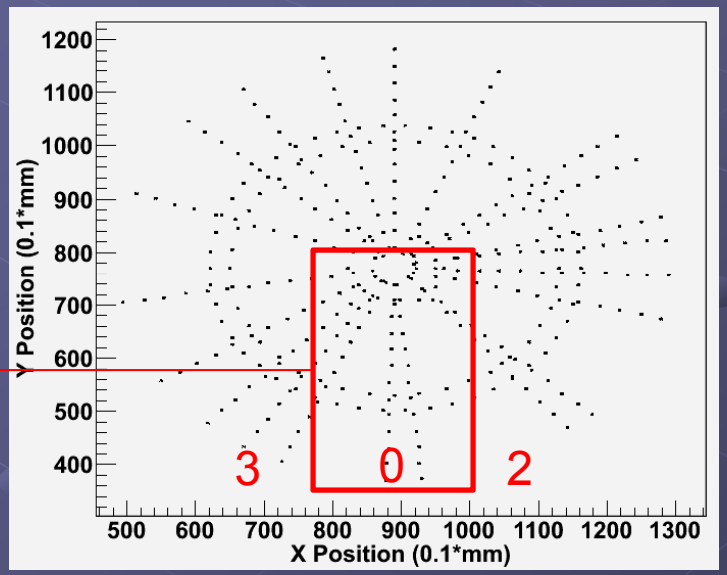
Coincidence Scan Data



A Simple Test



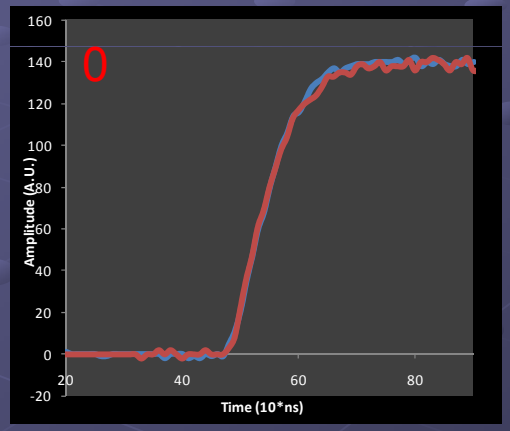


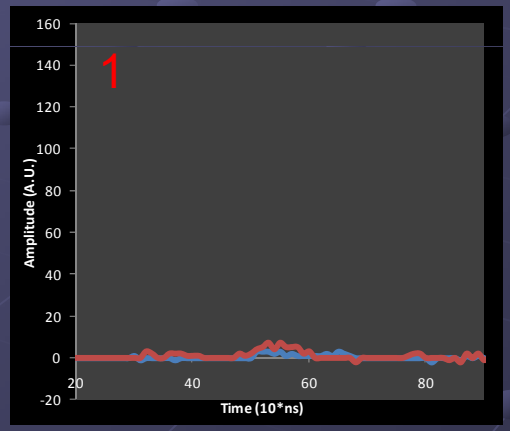


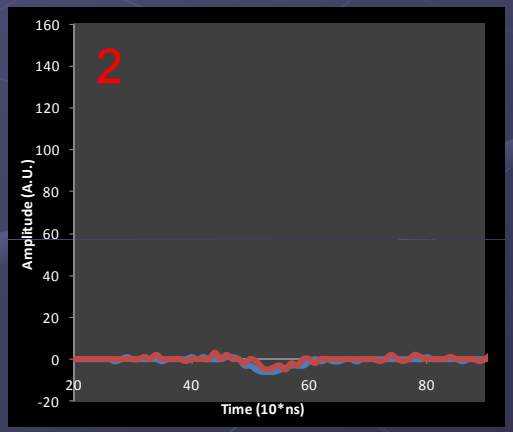
Pos X	Pos Y	Pos Z
890 (0.1*mm),	740 (0.1*mm),	168 (0.1*mm)

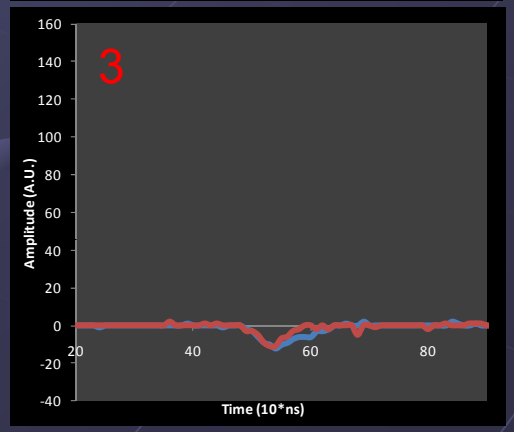
Front Face Singles Scan Data

Coincidence Scan Data

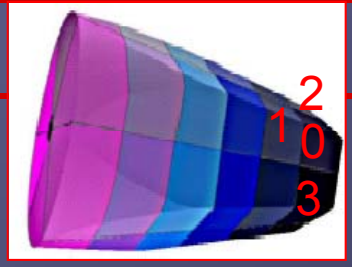


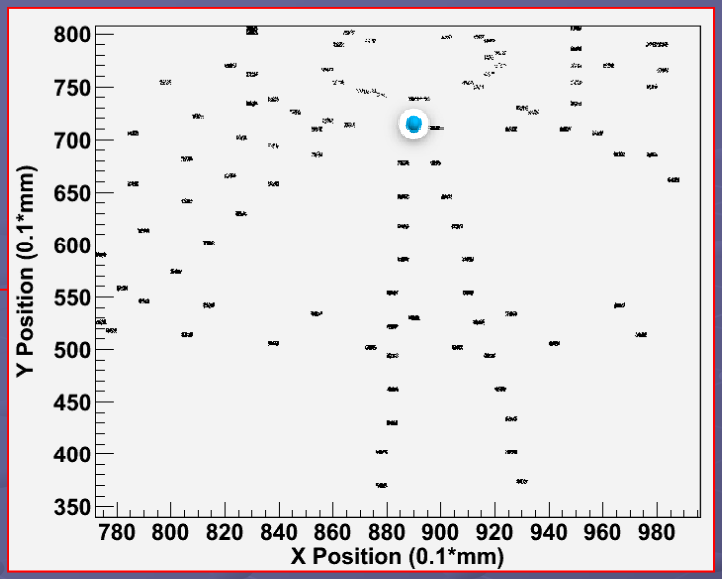


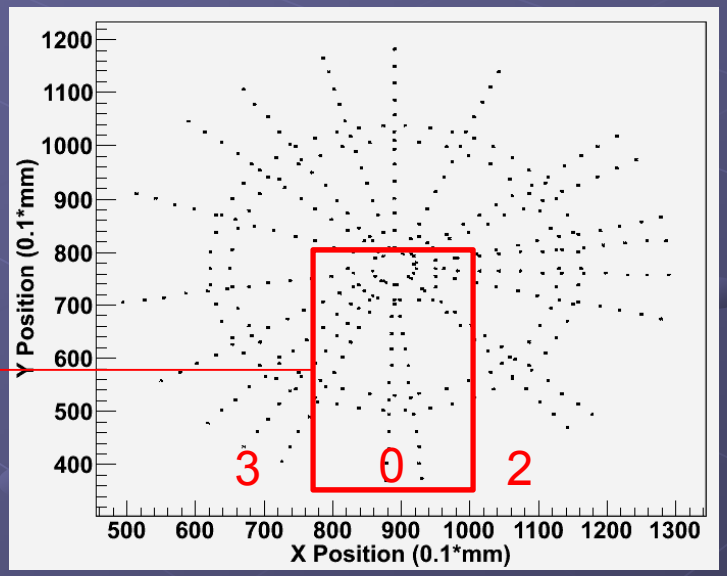




A Simple Test



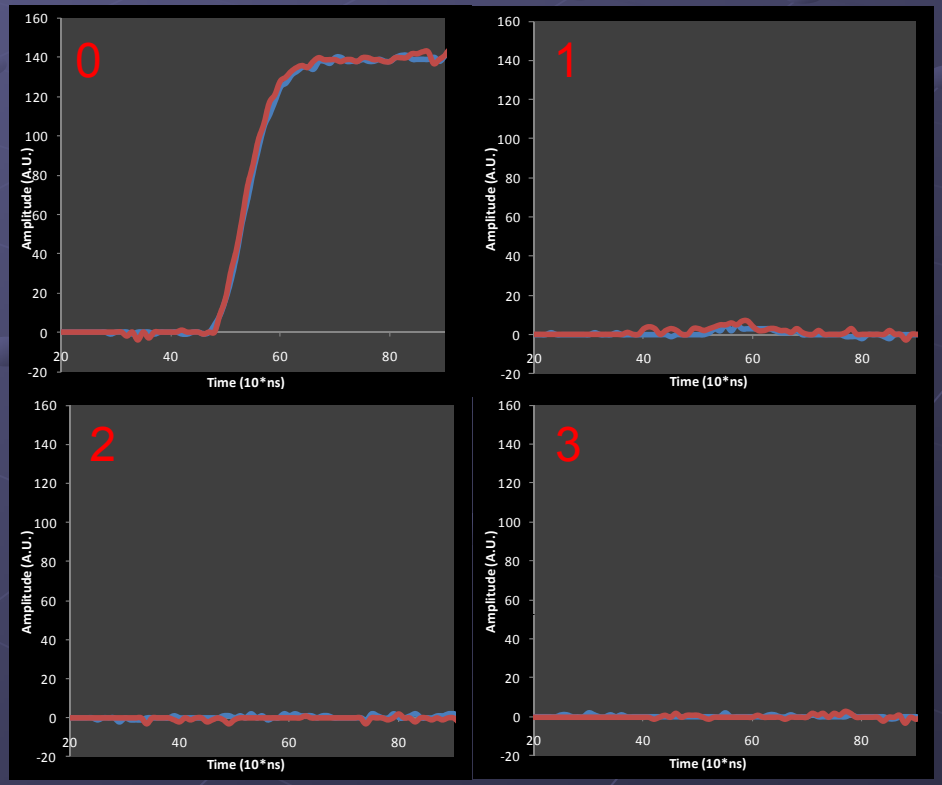




Pos X	Pos Y	Pos Z
890 (0.1*mm),	720 (0.1*mm),	168 (0.1*mm)

Front Face Singles Scan Data

Coincidence Scan Data



Conclusions and Perspectives:

- Presorted datasets for Front Face and Side Scan data have been produced. The traces have been normalized and time-aligned, they are now ready for applying the Pulse Shape Comparison Scan procedure.

- A simple test has been performed to check the consistency of the data.

- The PSCS will be applied to traces from segment A1 and then to all the detector positions for which sufficient statistics is present and the results will be compared with those obtained with the standard coincidence technique.

Acknowledgements

I absolutely have to thank Carl Unsworth for providing the scan data and Andrew Robinson for distributing the root format version of the files!