SegBEGe: determining surface event Φ using mirror pulses

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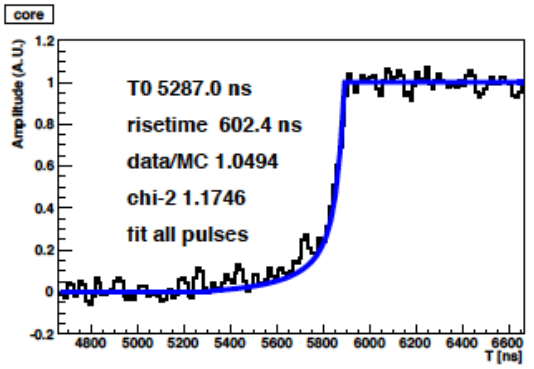
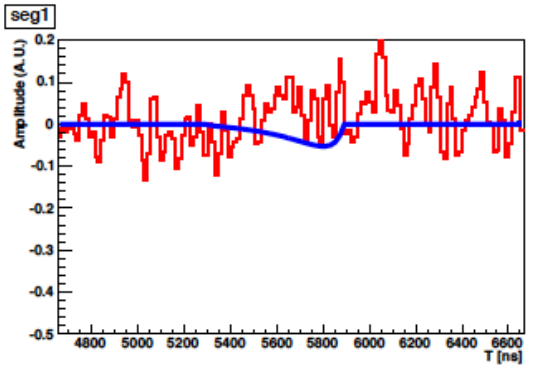
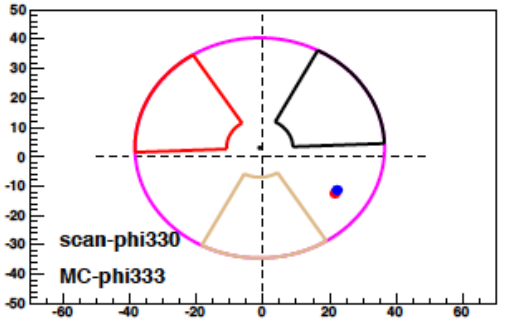
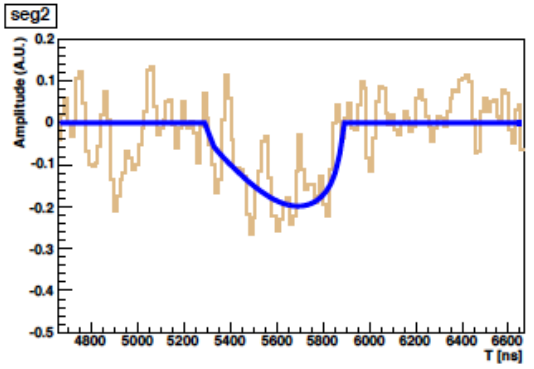
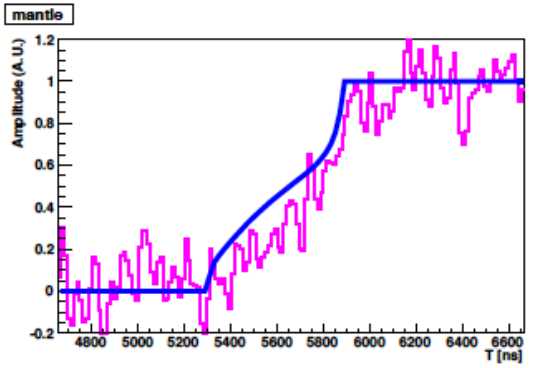
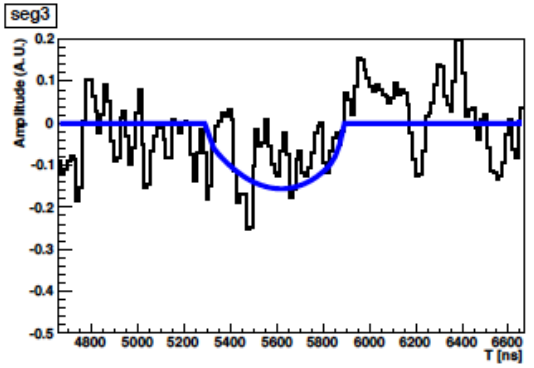








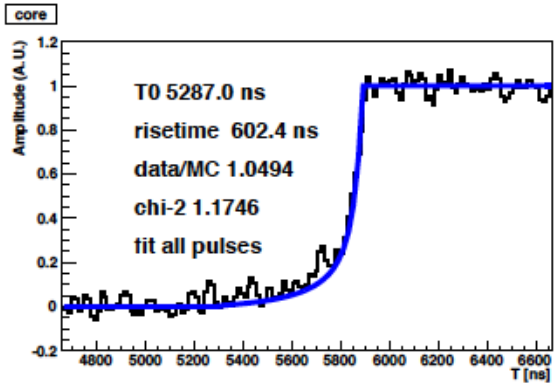


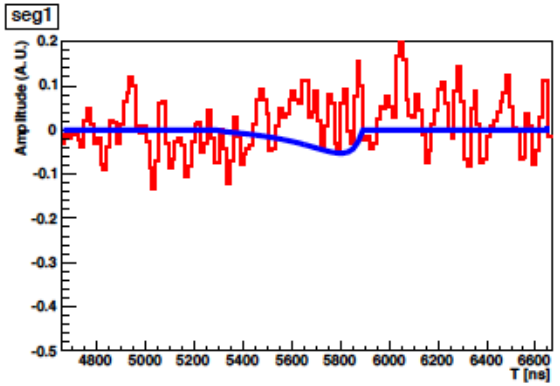


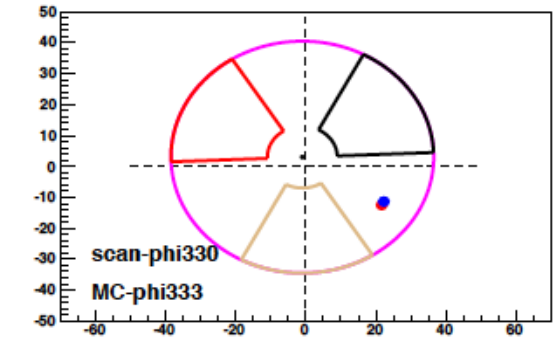
Segmentation motivation

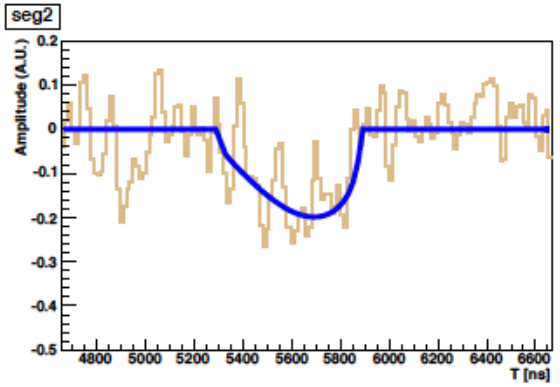
- keep BEGe core pulse properties,
- determine Φ position event by event,

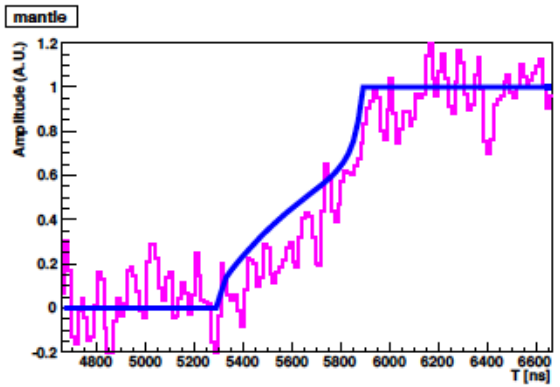
(one 81keV event from Ba133 source)

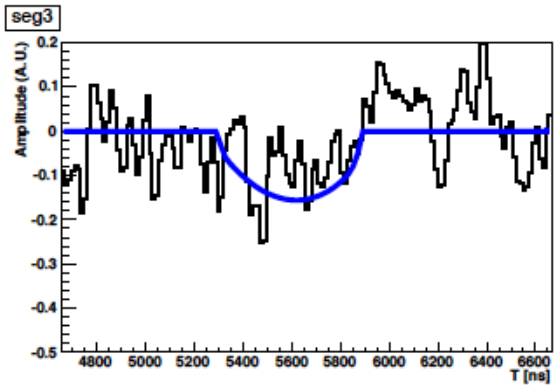








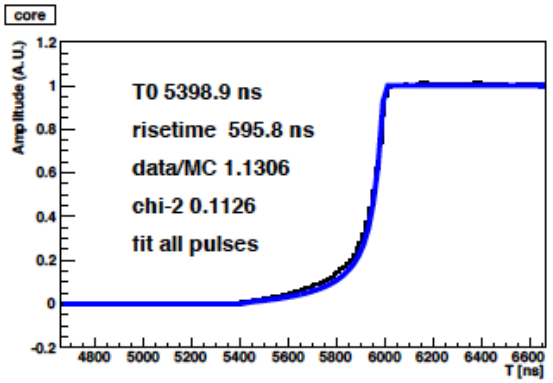


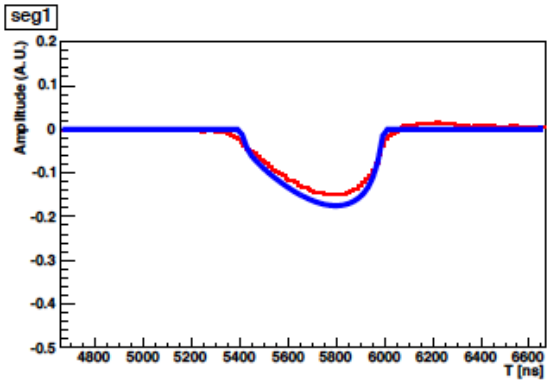


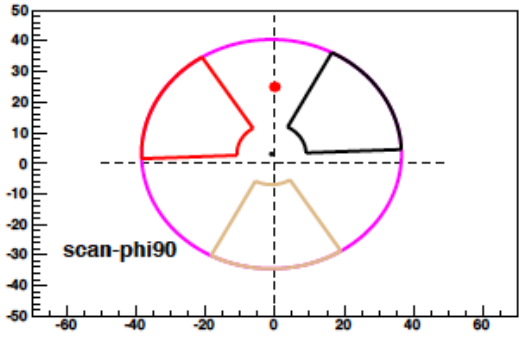
Verify principle with averaged pulses

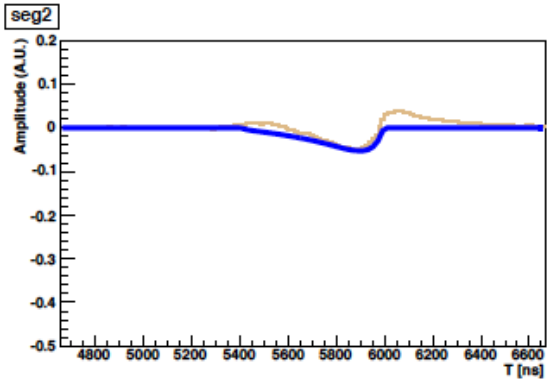
Data:
- Collimated Ba133 source (Φ3mm),
- Select single-segment 81keV events,
- Align pulses by core sharp rise.

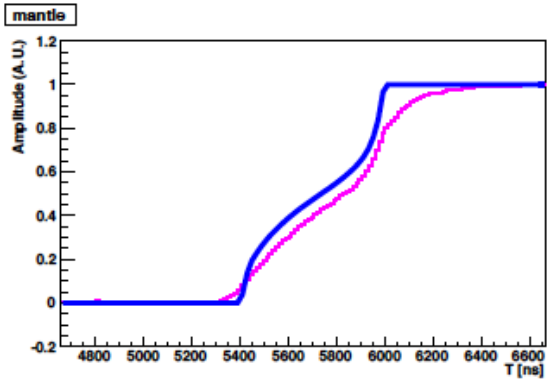
MC:
- single-point at 1.7mm depth, 77K,
- Impurity density modified,
- No preamp response,
- No cross talk,
- Stretch pulses for temperature effect.

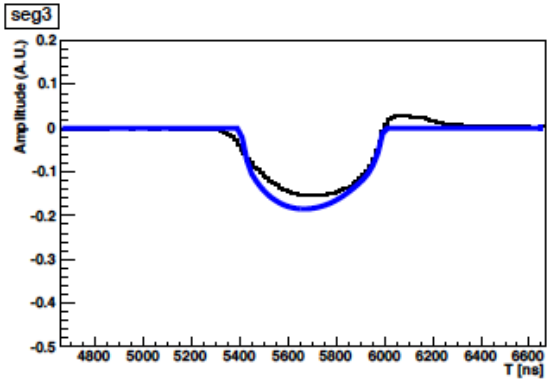






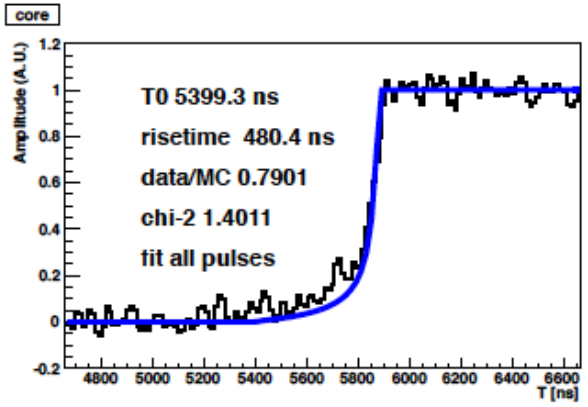


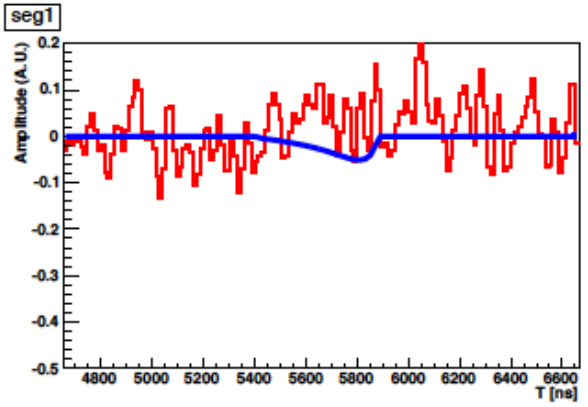


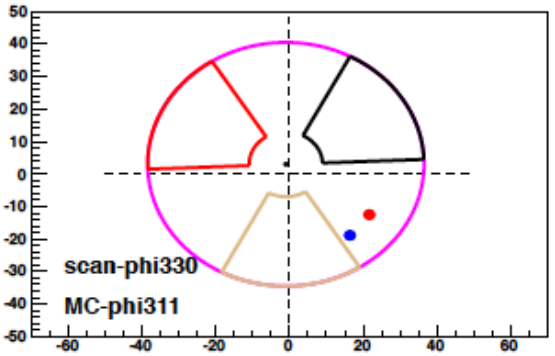


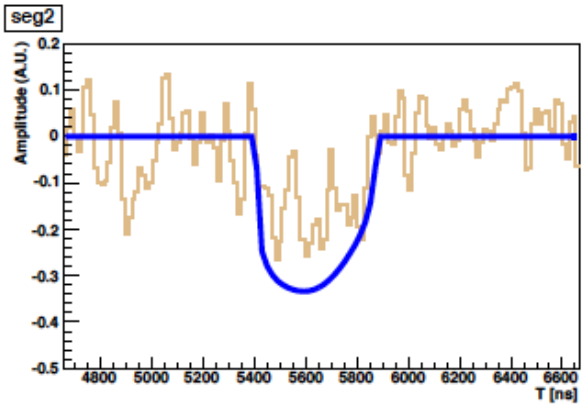
Locating Φ event-by-event

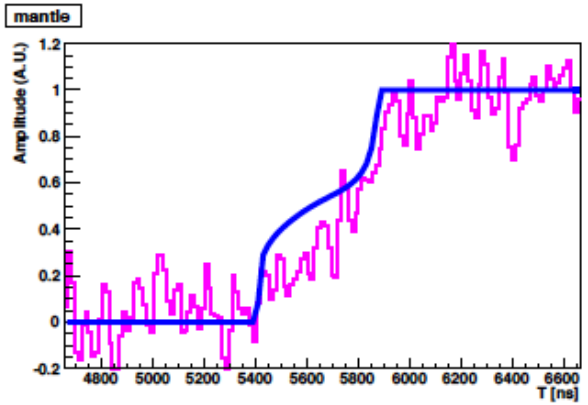
- Assume radius known beforehand,
- Fit data pulses with MC pulses at various Φ positions,
- Find minimum χ^2

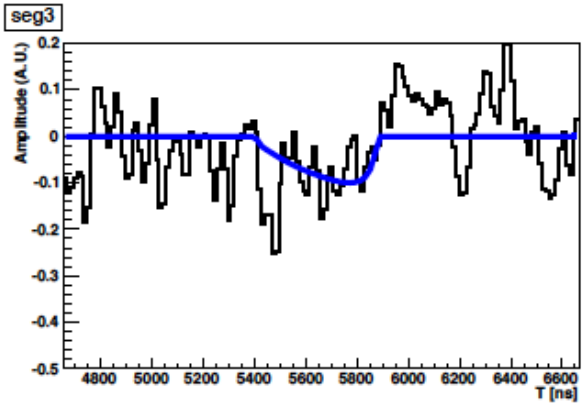












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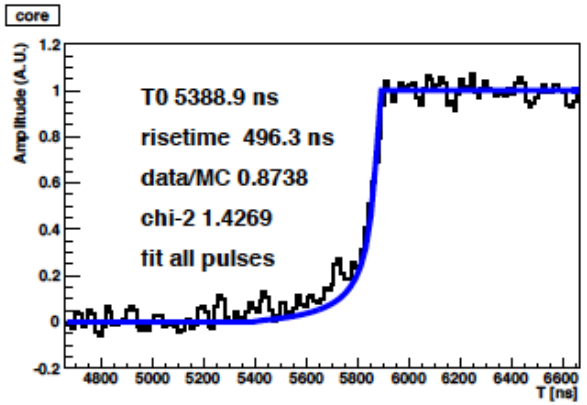

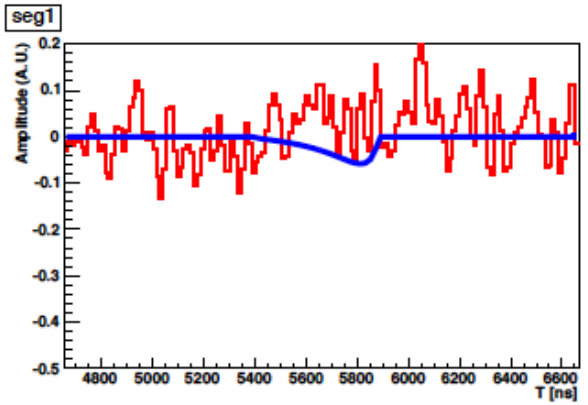

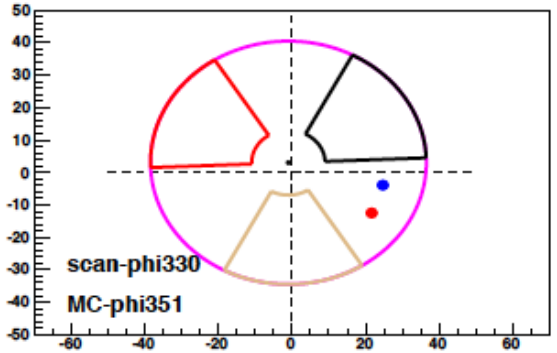

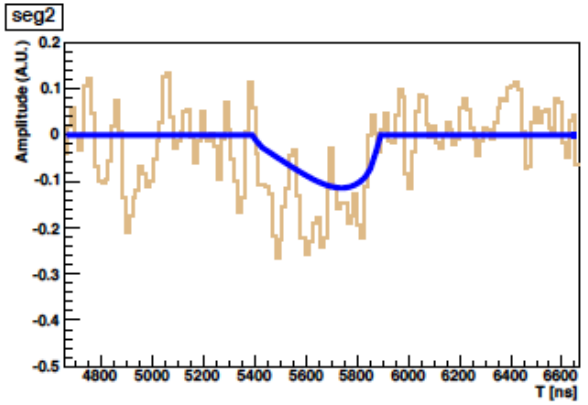

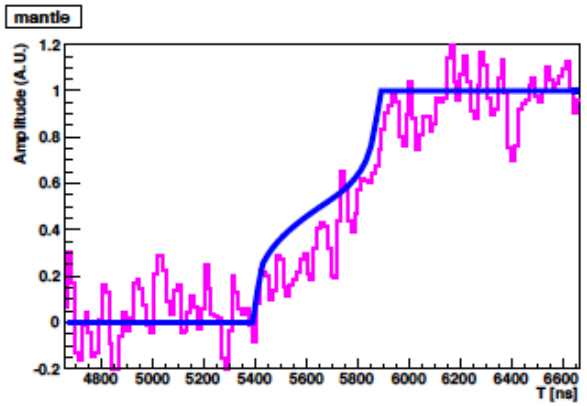

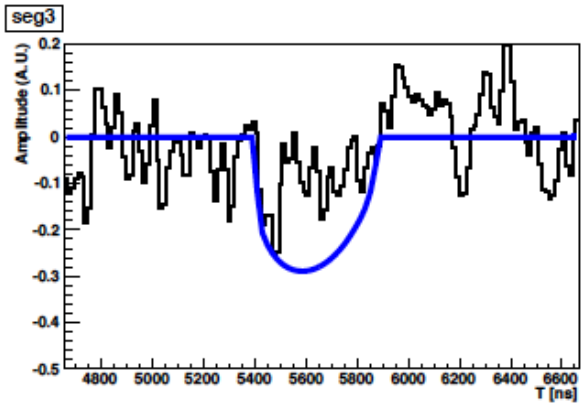

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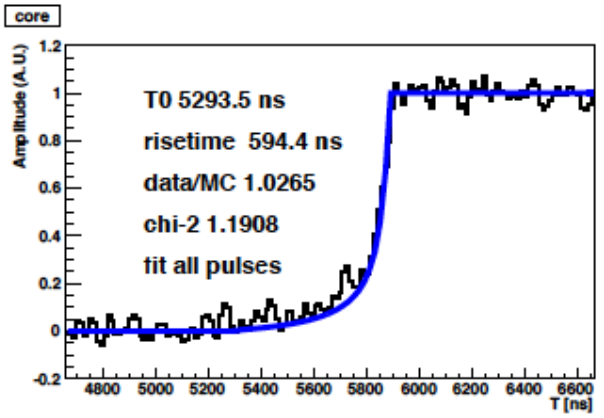
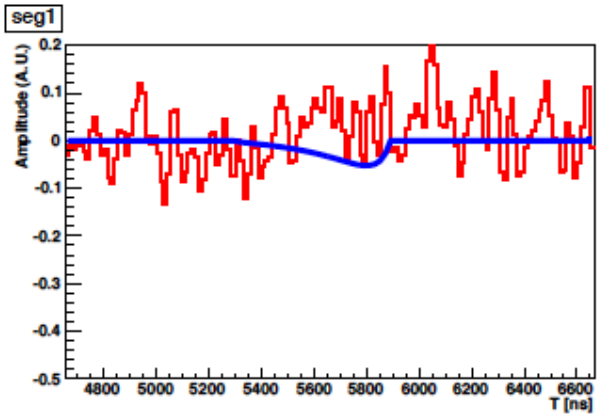
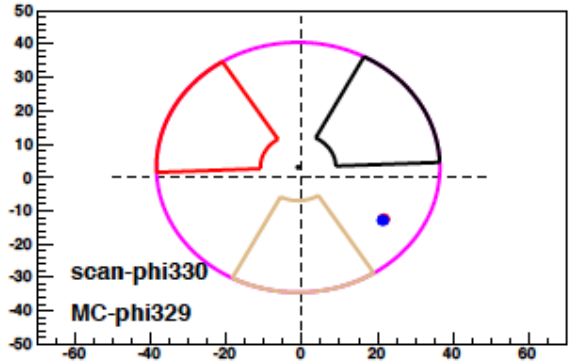
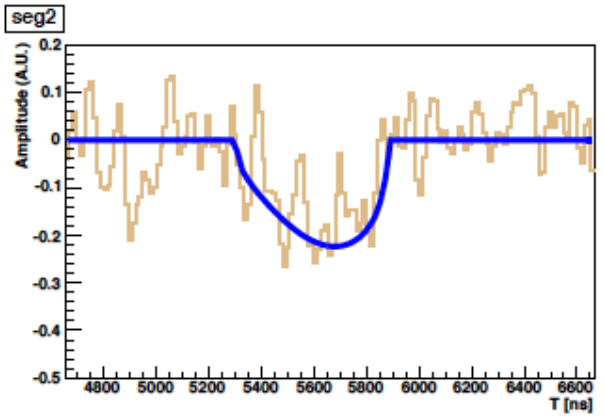
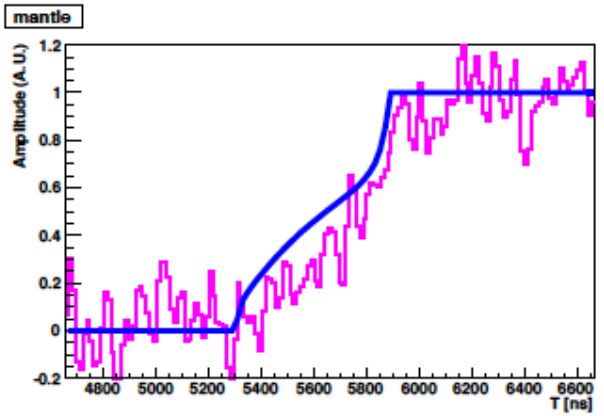
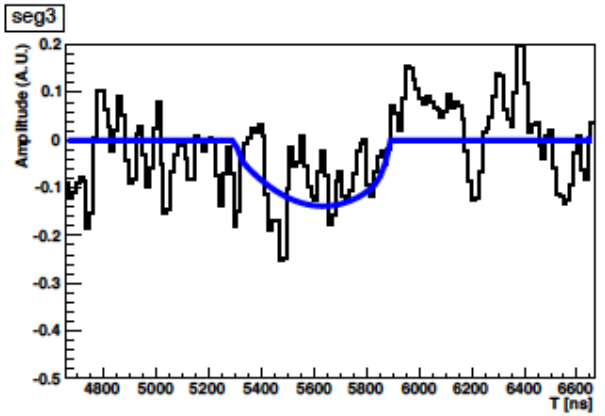








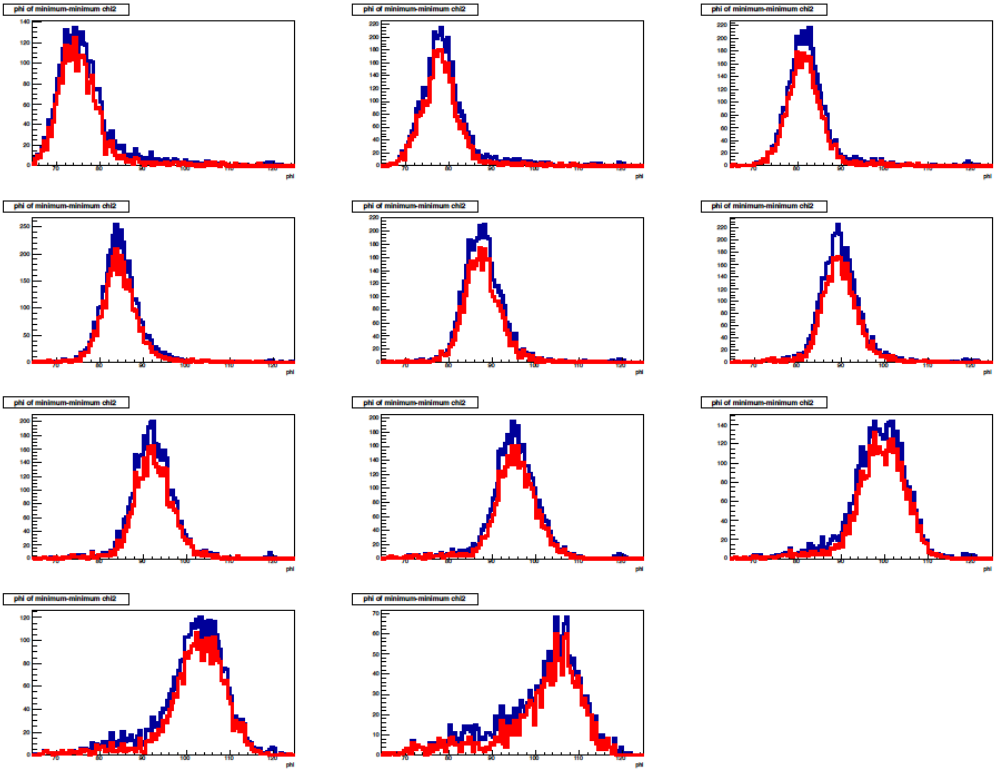




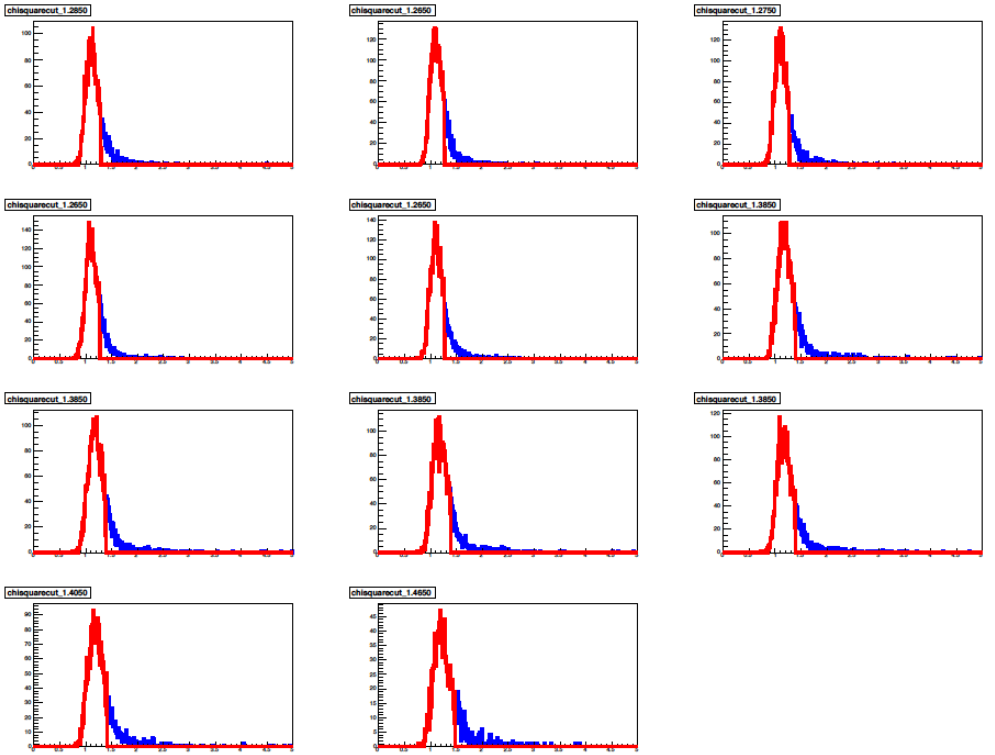
Locating Φ event-by-event

- Collimated Ba133 scan every 5 degrees, 11 data samples in one mantle section.

Fitted phi distributions



χ2 distributions



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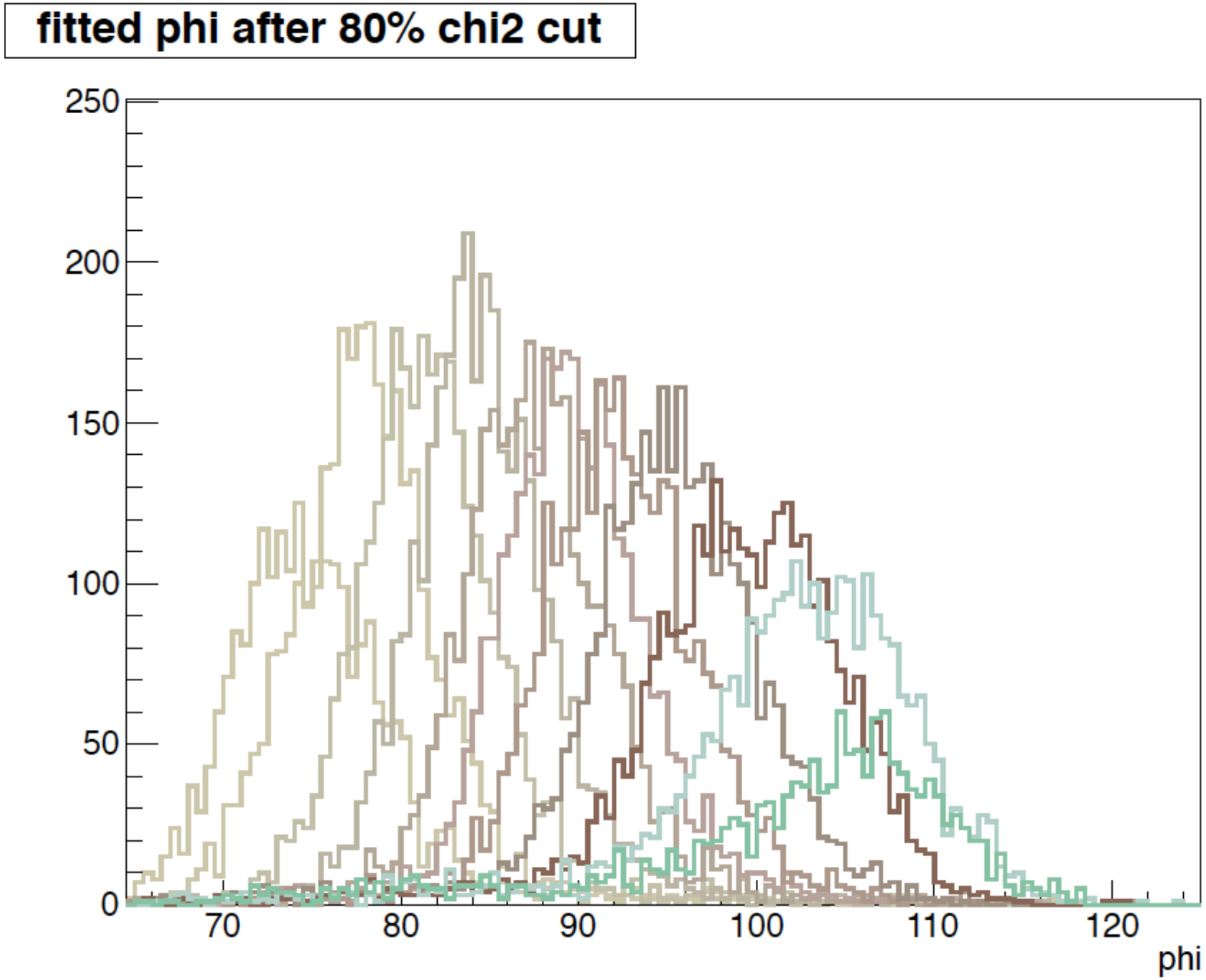

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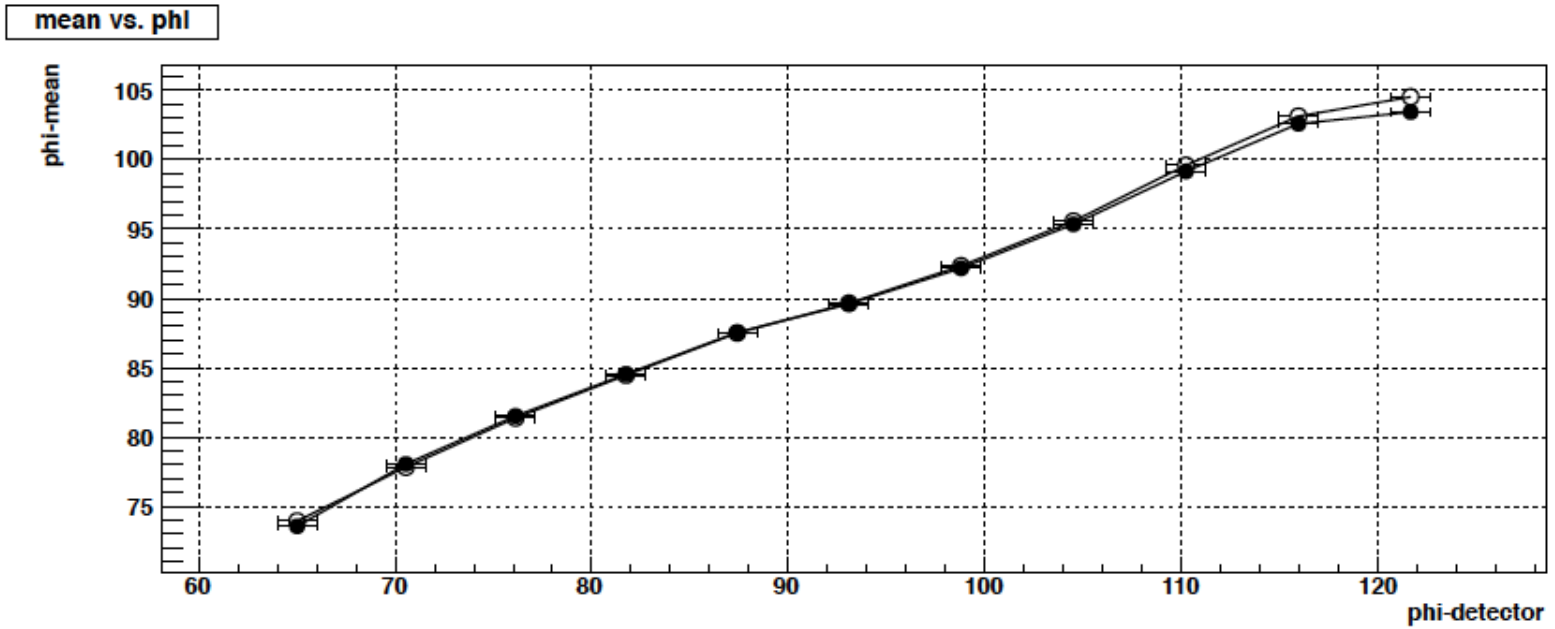

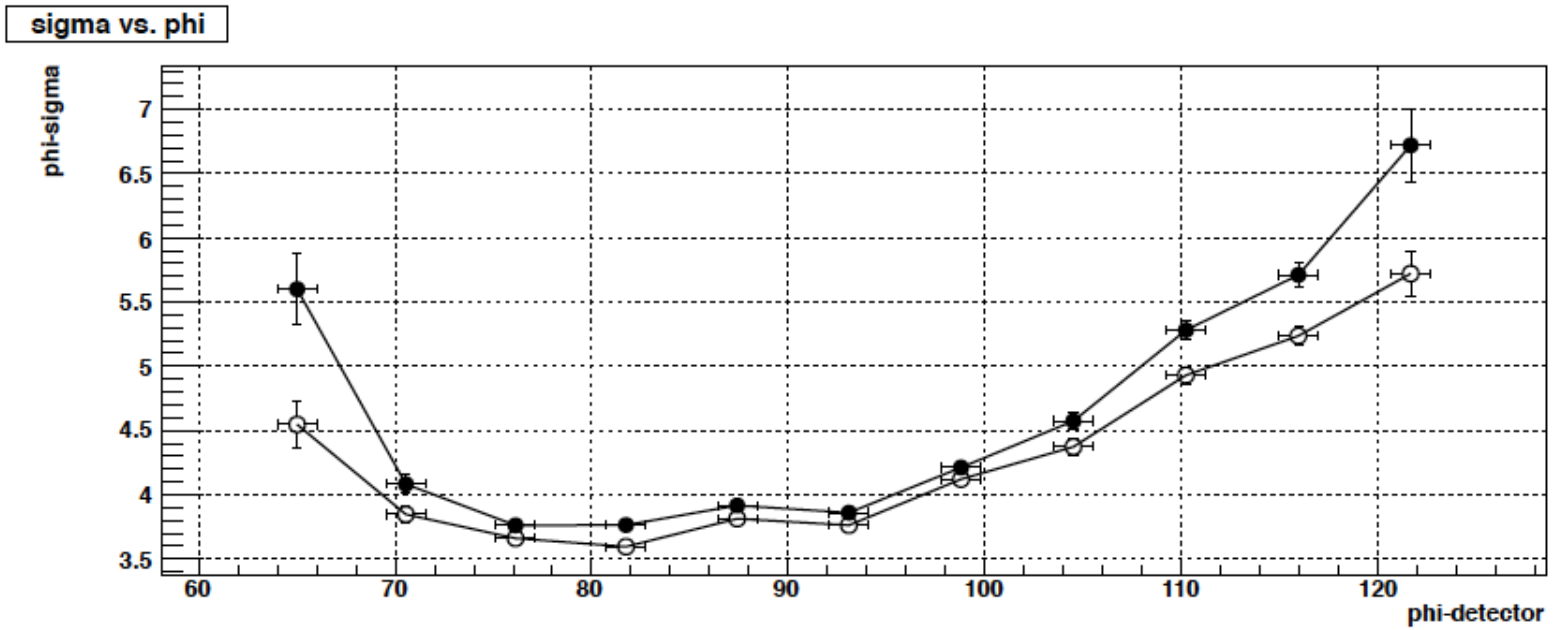

summary

Improve MC:
- Preamp response, Temperature, Cross talk, Impurity, Mobility…
- In ideal case, avoid “stretching”?
- Radius sensitivity and 2D surface fitting?

Improve detector understanding:
- Reduce further electronic noise,
- Understand property around core-contact,
- 3D scan in the future.