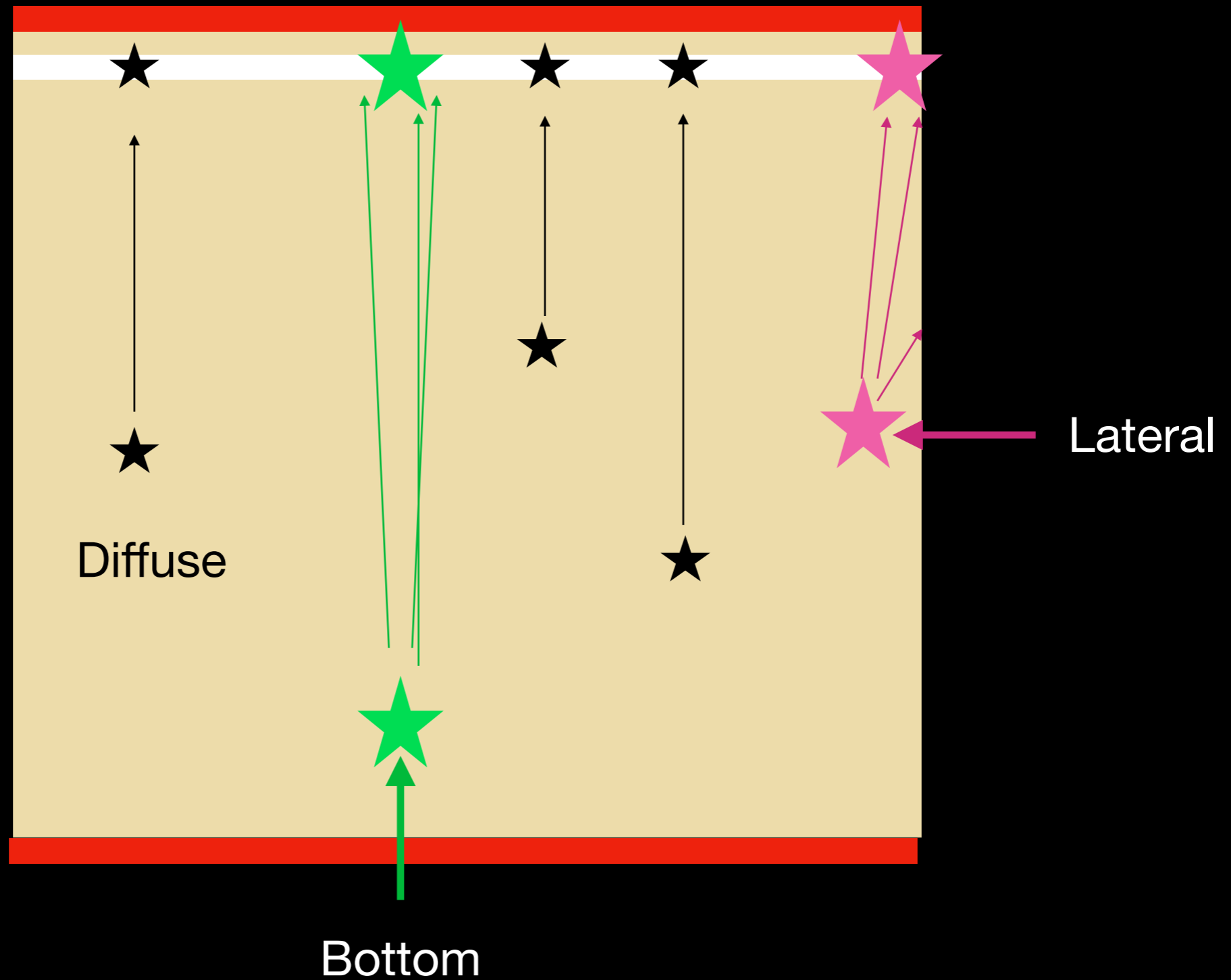


DS20k calibration: the bottom pipe

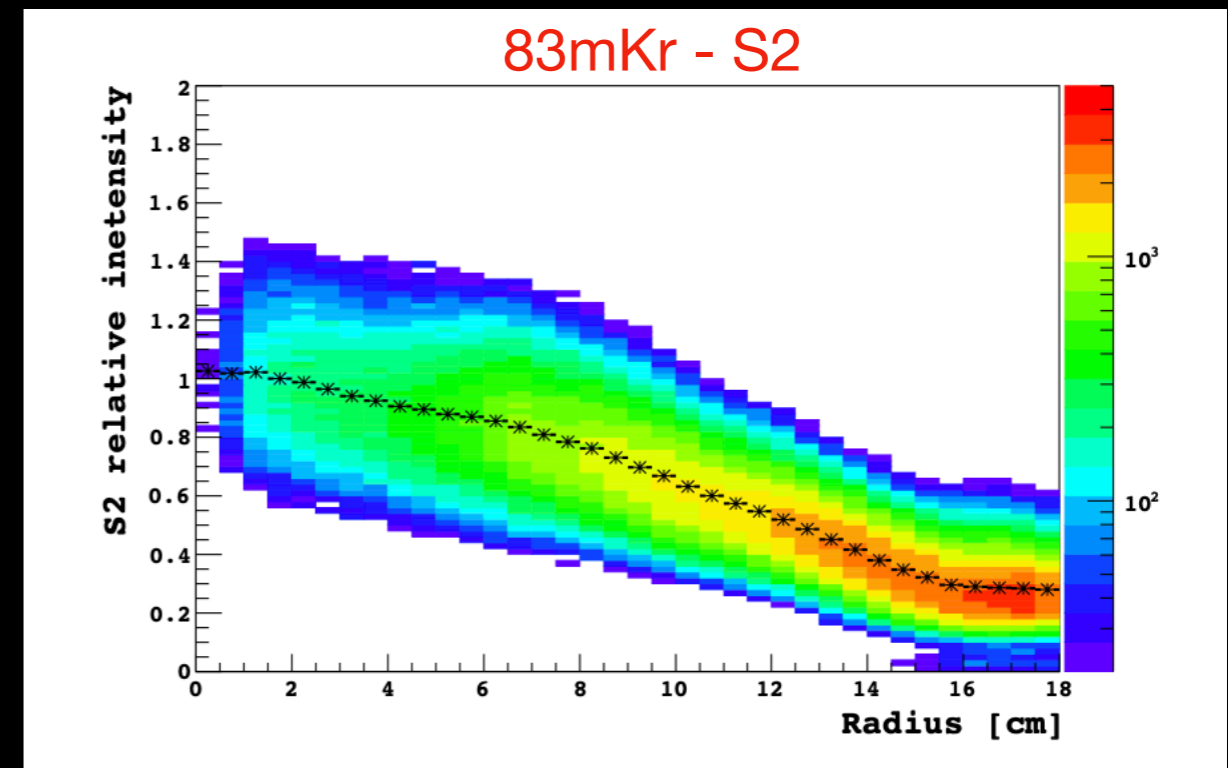
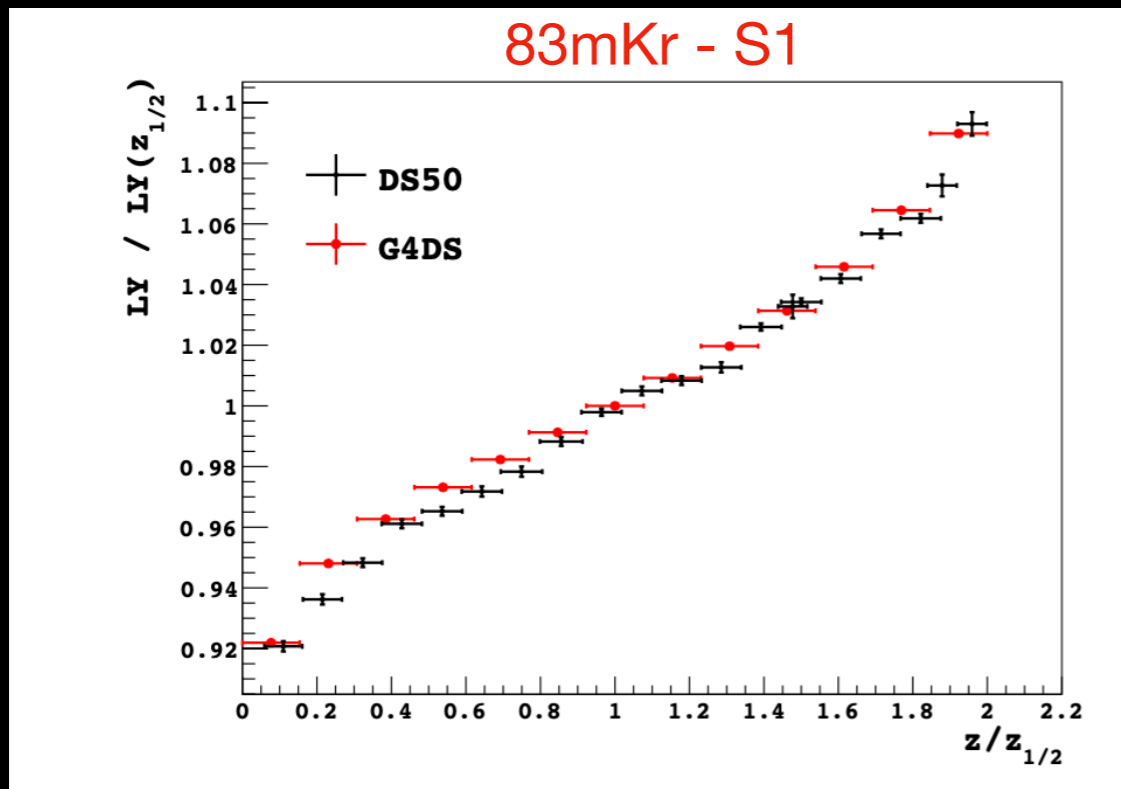
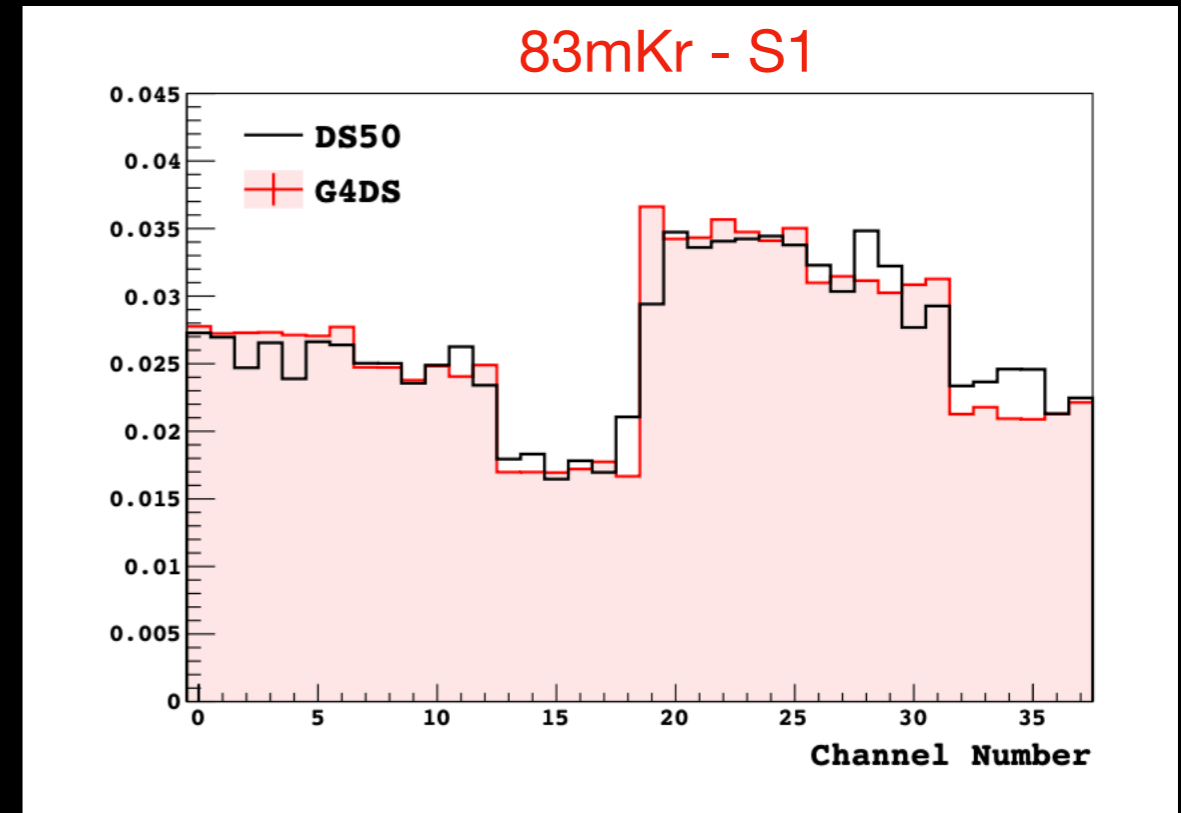
Davide

Calibration options



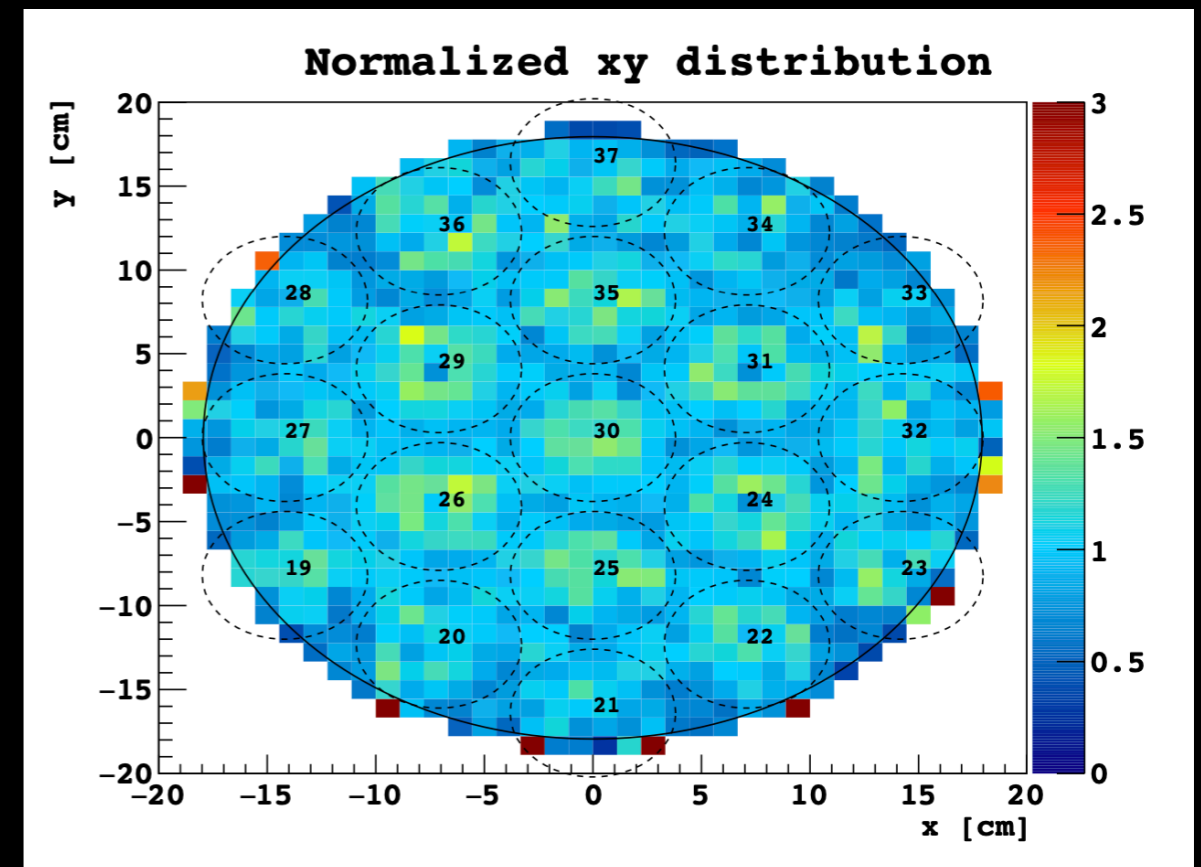
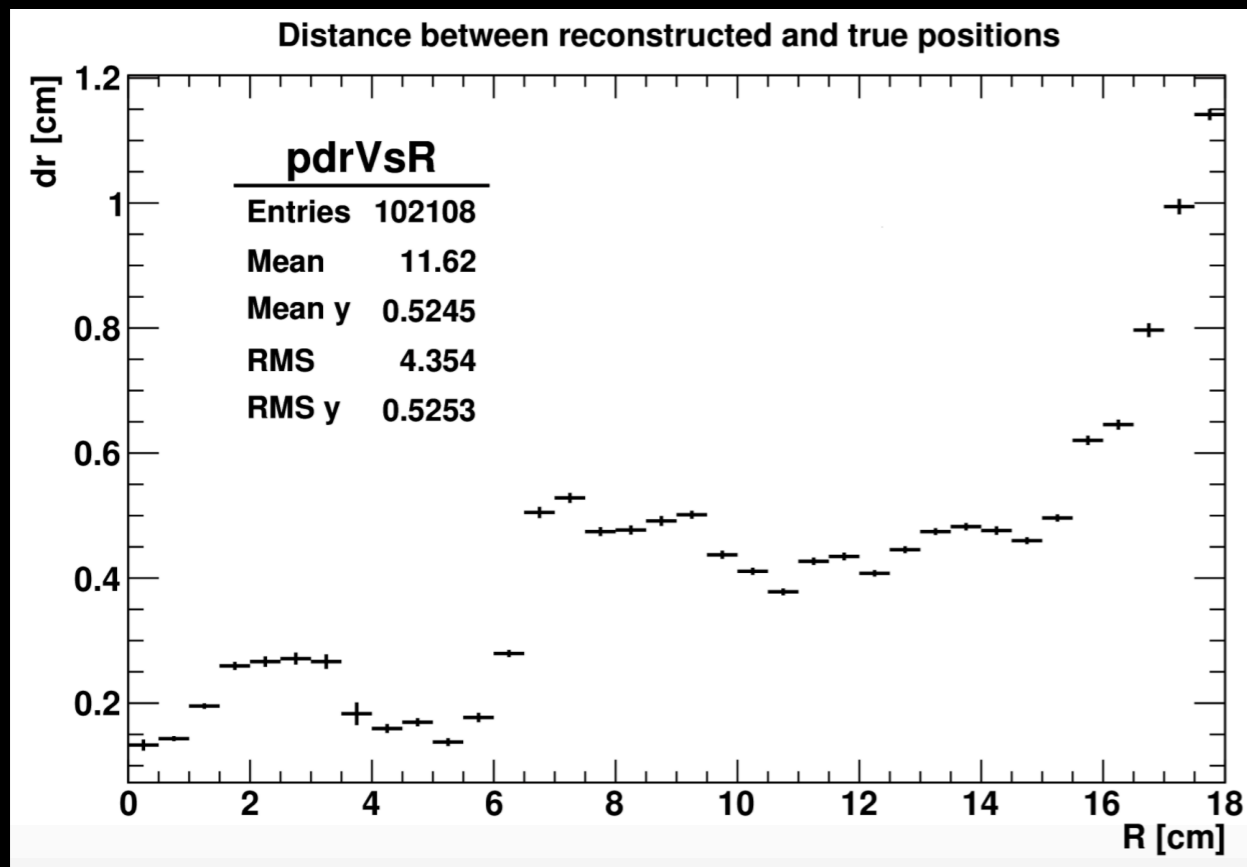
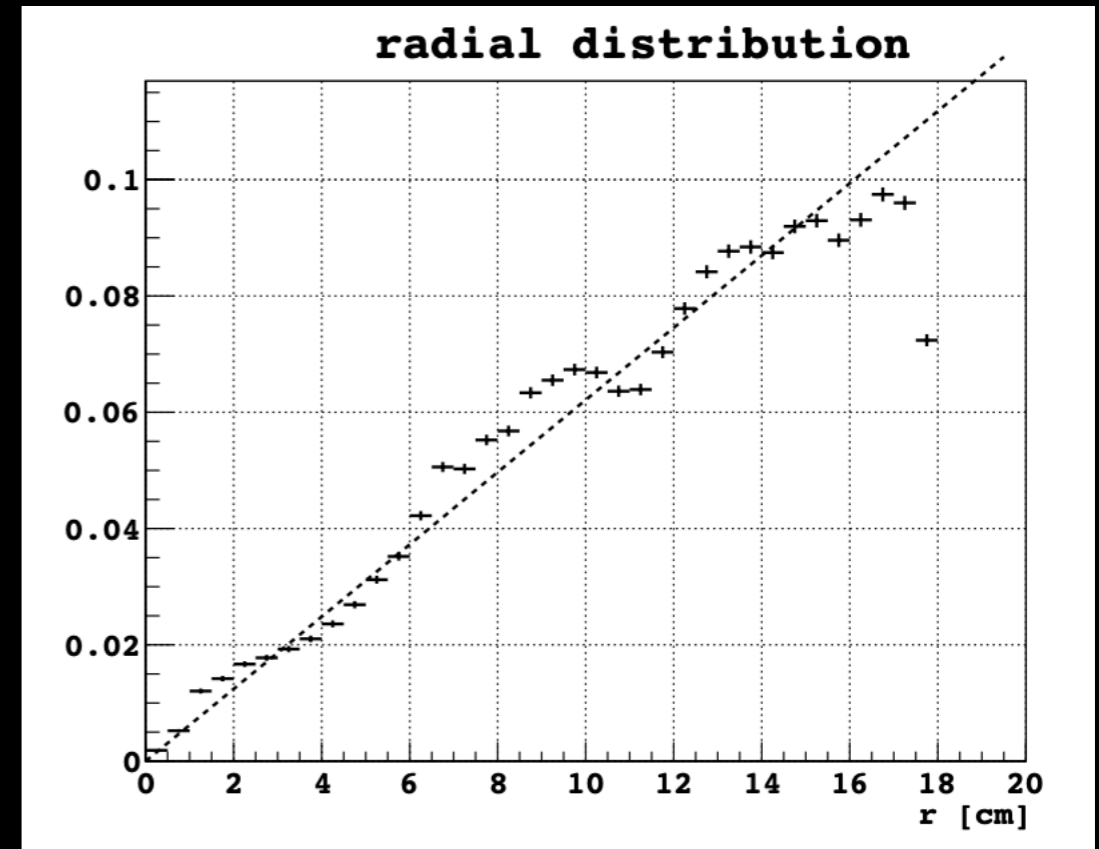
What to calibrate?

- Optical response
- S1 vs r_{xy}
- S1 vs z
- S2 vs r_{xy}
- XY reconstruction



What to calibrate?

- Optical response
- S1 vs r_{xy}
- S1 vs z
- g2 vs r_{xy}
- XY reconstruction: DS50 used only a diffused source



Calibration options: diffused and lateral

Standard **diffused** source (83mKr) allows to:

- map s1 vs z and vs xy (max channel)
- map s2 vs xy (max channel)

But it does not allow to extract g2

- 83mKr emits two lines (~10 and 30 keV), and their ionization clouds overlap biases the S2 response

Partially useful for testing xy reconstruction

- the only signature is the radial distribution

Lateral sources allows to tune the optics and (after a big big effort) to infer the S1 LY field-on/field-off

S2 suffers from electric field border effects

not so informative for testing xy at the border

Calibration options: lateral

Strategy:

- ^{39}Ar used to calibrate the optics and the energy response
- External sources used to VALIDATE the simulations (but not included in the fit)

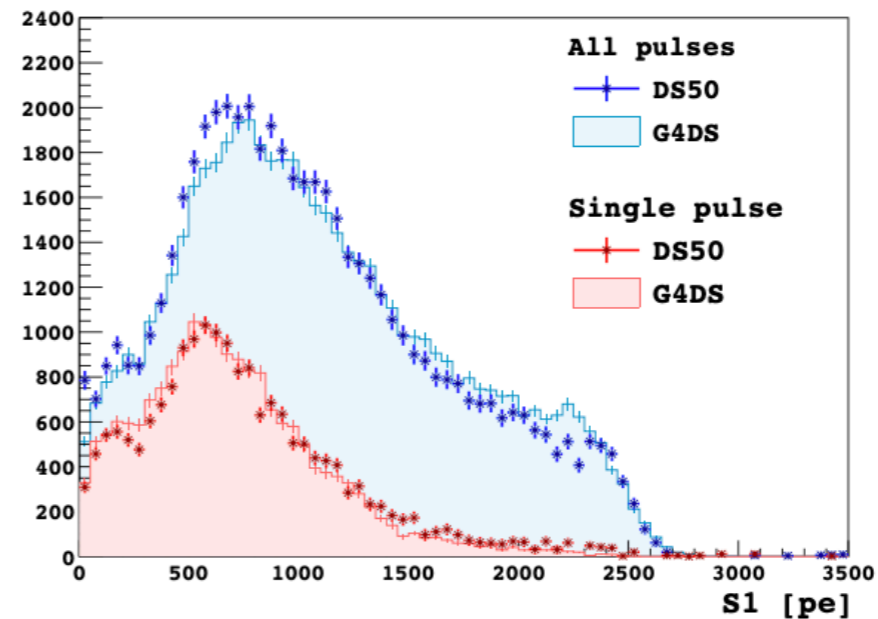
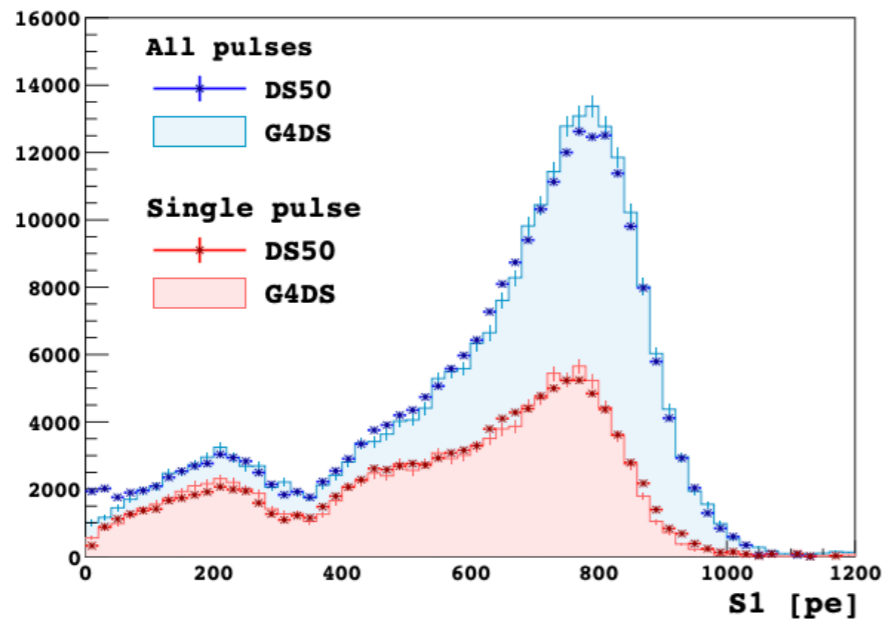
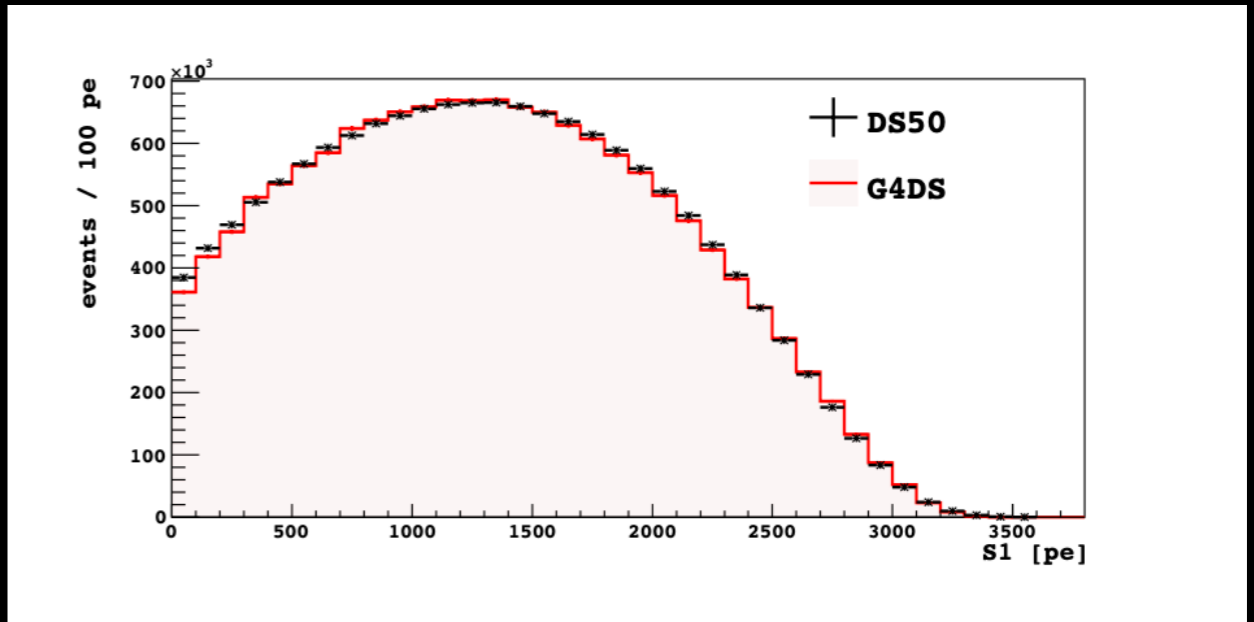


Figure 14. Single and multiple scatter S1 spectra of ^{57}Co (left) and ^{133}Ba (right) calibration sources in DarkSide-50 data, after background subtraction, and G4DS.

Calibration options: bottom

- Good event by event selection with xy + drift time
- Ideal for testing xy : point like source well localized in xy
- Ideal for testing $S1$ vs xy
- Ideal for testing $S2$ vs xy