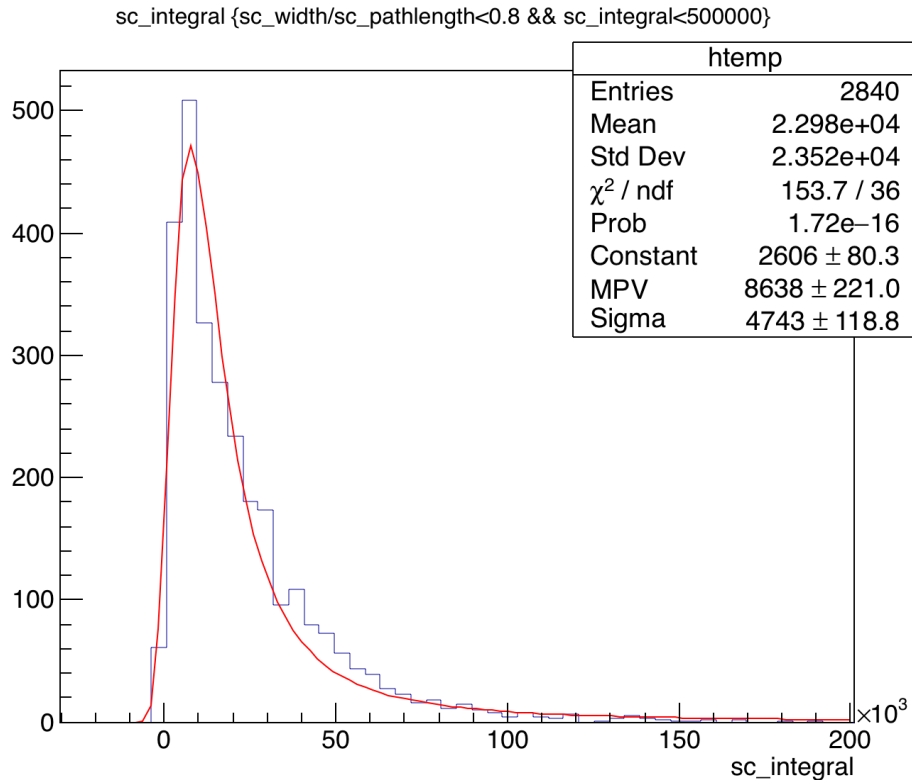# the Iron Source

First look at the MANGO data with ^{133}Ba and ^{55}Fe

Ba133 delta
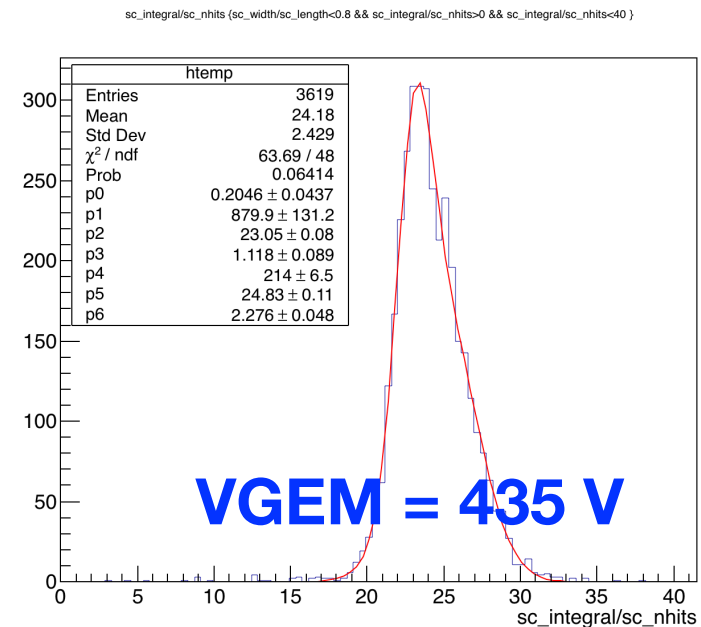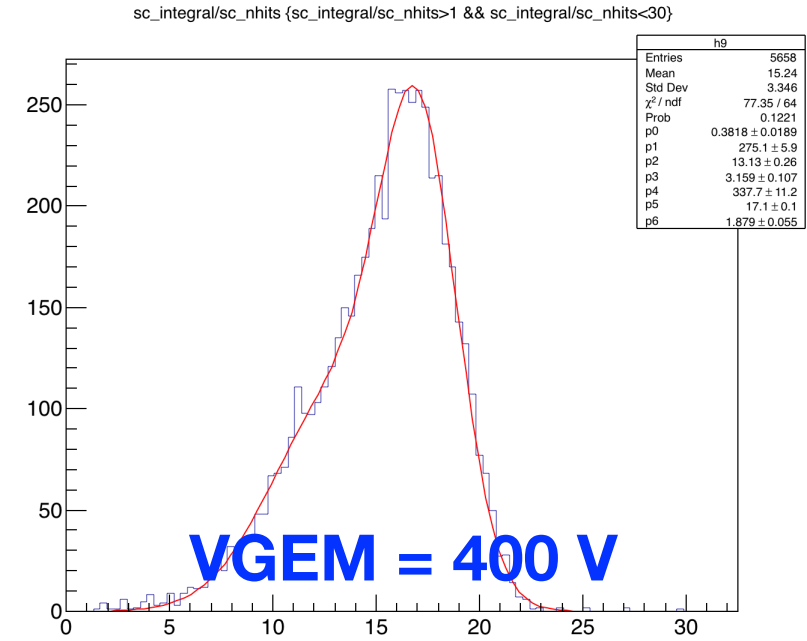
Ba133 energy spectrum

sc_integral {sc_width/sc_pathlength<0.8 && sc_integral<500000}

htemp	
Entries	2840
Mean	2.298e+04
Std Dev	2.352e+04
χ^2 / ndf	153.7 / 36
Prob	1.72e−16
Constant	2606 ± 80.3
MPV	8638 ± 221.0
Sigma	4743 ± 118.8

sc_integral/sc_nhits {sc_integral/sc_nhits>1 && sc_integral/sc_nhits<30}

h9	
Entries	5658
Mean	15.24
Std Dev	3.346
χ^2 / ndf	77.35 / 64
Prob	0.1221
p0	0.3818 ± 0.0189
p1	275.1 ± 5.9
p2	13.13 ± 0.26
p3	3.159 ± 0.107
p4	337.7 ± 11.2
p5	17.1 ± 0.1
p6	1.879 ± 0.055

VGEM = 400 V

slimness<0.8

sc_integral/sc_nhits {sc_width/sc_length<0.8 && sc_integral/sc_nhits>0 && sc_integral/sc_nhits<40 }

htemp	
Entries	3619
Mean	24.18
Std Dev	2.429
χ^2 / ndf	63.69 / 48
Prob	0.06414
p0	0.2046 ± 0.0437
p1	879.9 ± 131.2
p2	23.05 ± 0.08
p3	1.118 ± 0.089
p4	214 ± 6.5
p5	24.83 ± 0.11
p6	2.276 ± 0.048

VGEM = 435 V
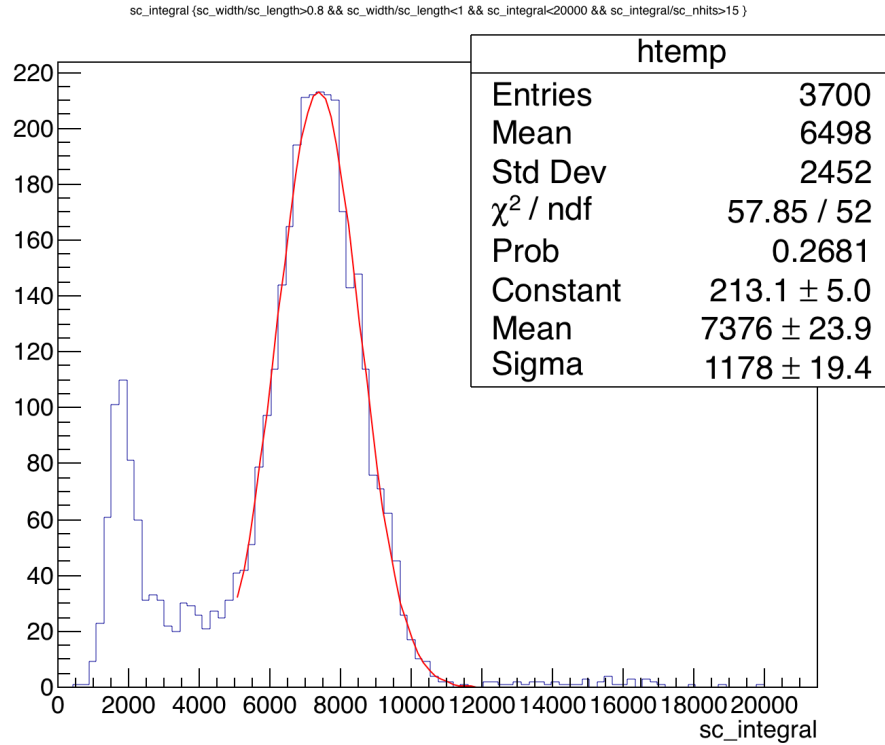
Ba133 energy spectrum simulated by Andre on geant4 show similar shape with peak at 6.00 keV

Fe55 delta

Fe55 energy spectrum

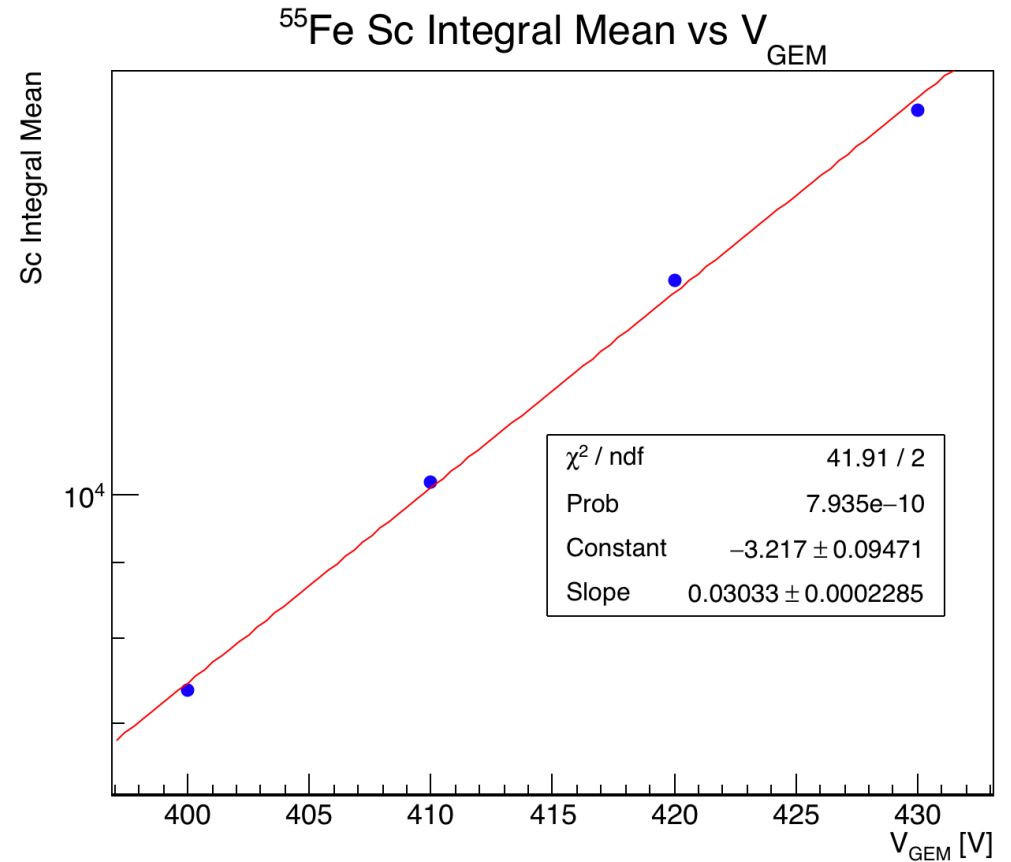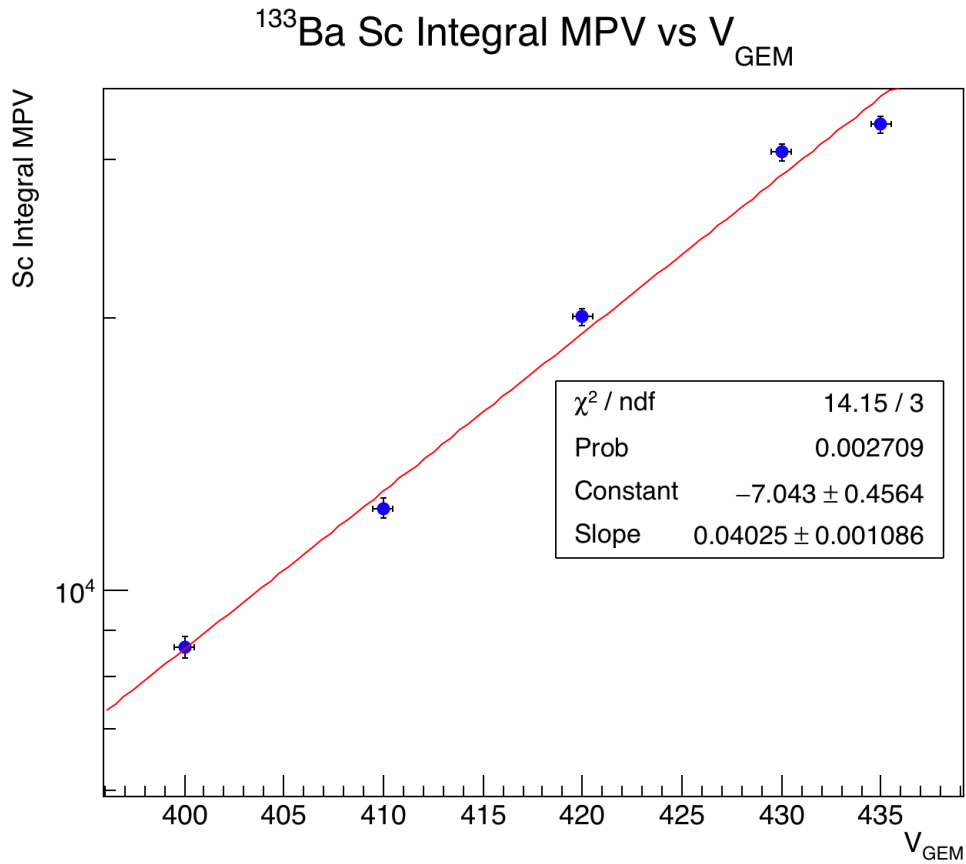sc_integral {sc_width/sc_length>0.8 && sc_width/sc_length<1 && sc_integral<20000 && sc_integral/sc_nhits>15 }

htemp	
Entries	3700
Mean	6498
Std Dev	2452
χ^2 / ndf	57.85 / 52
Prob	0.2681
Constant	213.1 ± 5.0
Mean	7376 ± 23.9
Sigma	1178 ± 19.4

VGEM = 400 V

slimness>0.8 &&
delta > delta_mean - 3*delta_sigma

sc_integral/sc_nhits {sc_integral/sc_nhits>0 &&sc_integral/sc_nhits<50}

htemp	
Entries	41706
Mean	9.583
Std Dev	6.614
χ^2 / ndf	991.6 / 86
Prob	0
p0	4.889 ± 0.293
p1	317.9 ± 19.1
p2	6.447 ± 0.051
p3	5.817 ± 0.073
p4	−221.5 ± 17.3
p5	18.95 ± 0.02
p6	−1.09 ± 0.02

VGEM = 400 V

sc_integral/sc_nhits {sc_integral/sc_nhits>10 &&sc_integral/sc_nhits<50}

htemp	
Entries	6660
Mean	25.48
Std Dev	2.605
χ^2 / ndf	110.1 / 55
Prob	1.509e−05
p0	0.4864 ± 0.0097
p1	426.1 ± 15.2
p2	23.98 ± 0.11
p3	2.376 ± 0.049
p4	744.1 ± 12.7
p5	27.13 ± 0.05
p6	1.208 ± 0.035

VGEM = 435 V

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shape slightly different (but 435 V yet to be added to Fe55)

^{133}Ba Sc Integral MPV vs V_{GEM}

χ^2 / ndf	14.15 / 3
Prob	0.002709
Constant	-7.043 ± 0.4564
Slope	0.04025 ± 0.001086

^{55}Fe Sc Integral Mean vs V_{GEM}

χ^2 / ndf	41.91 / 2
Prob	7.935e$-$10
Constant	-3.217 ± 0.09471
Slope	0.03033 ± 0.0002285

400 V	1.25 #/keV
410 V	1.73 #/keV
420 V	2.37 #/keV
430 V	3.08 #/keV

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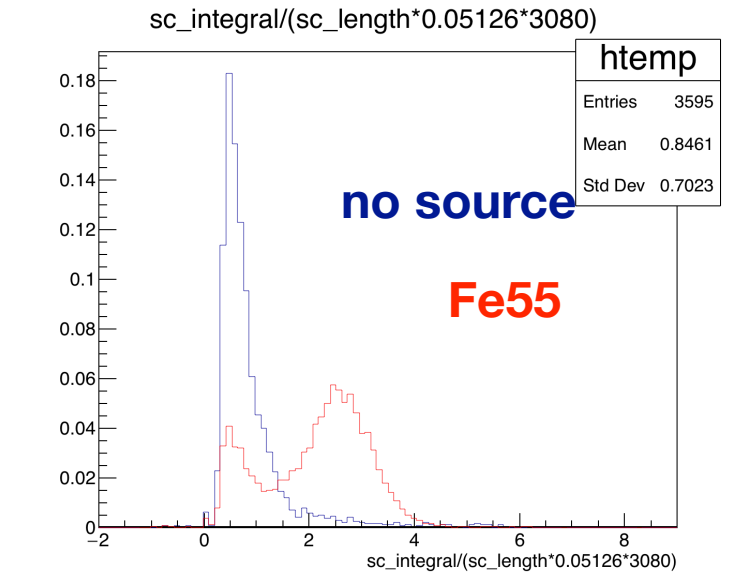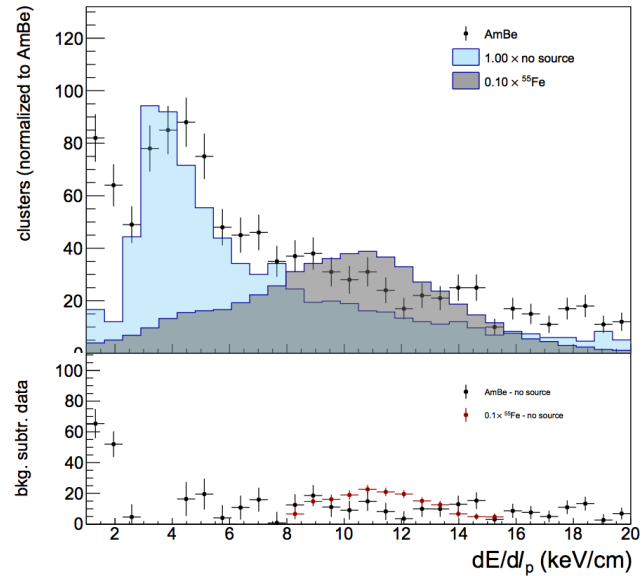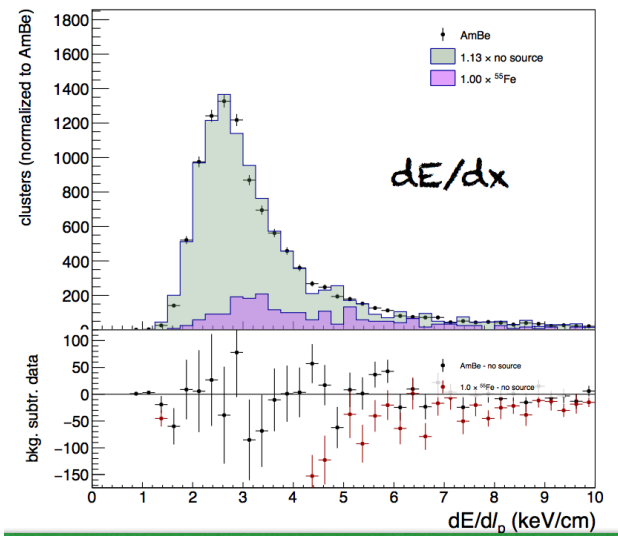# issues/questions: which pathlength for dE/dx?
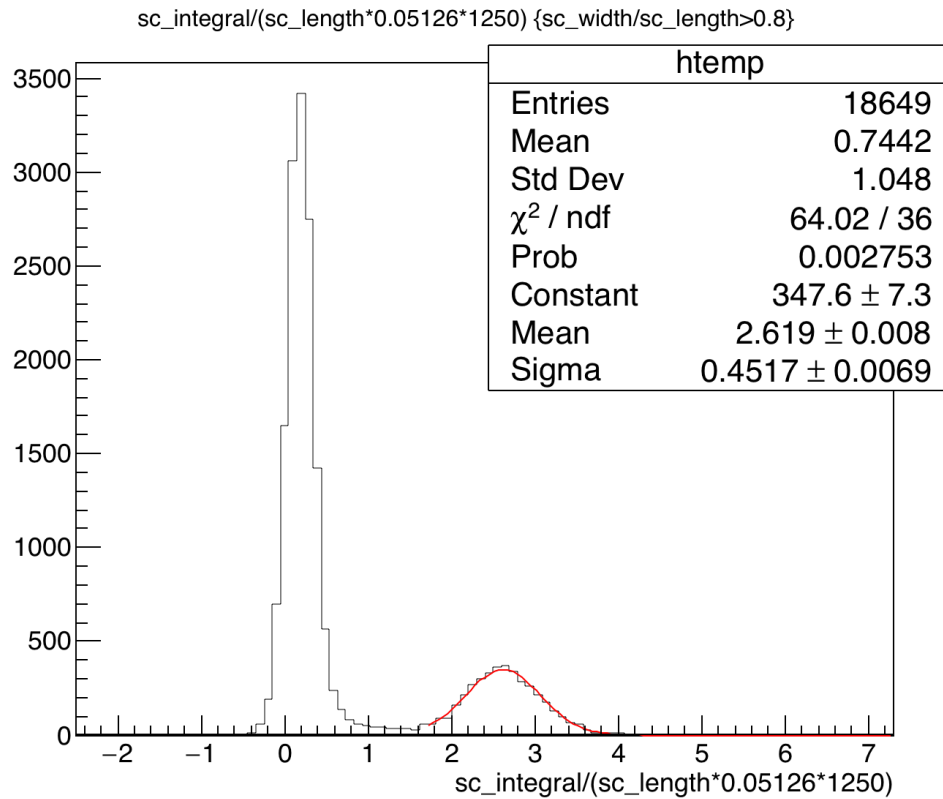
with sc_lenght
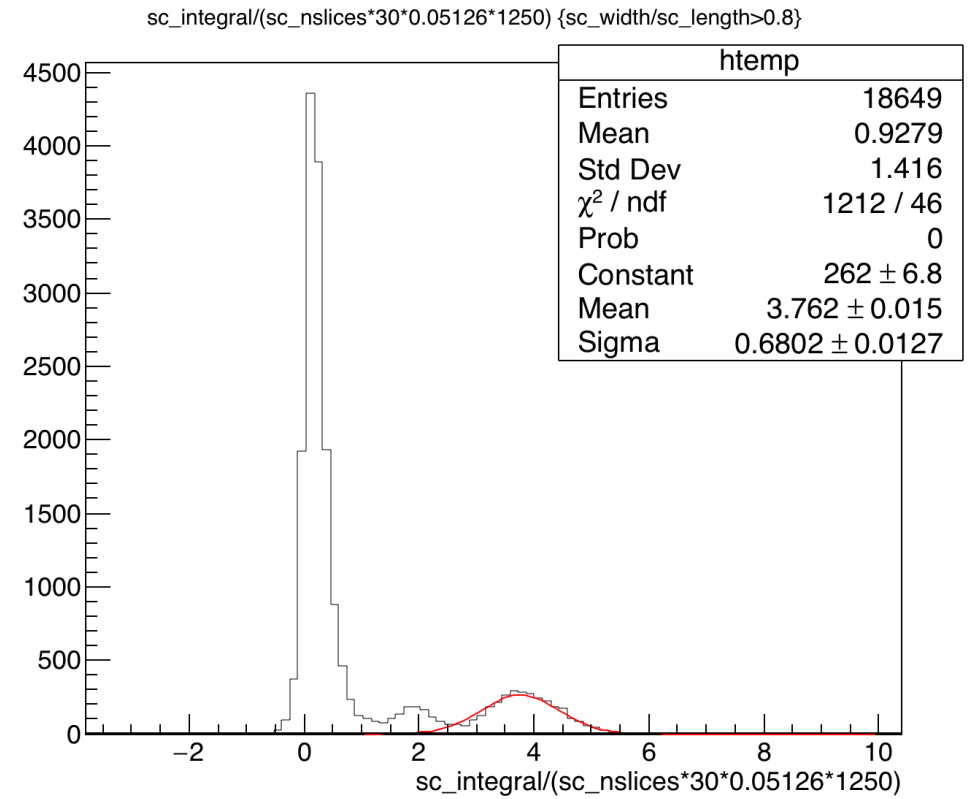
with n_slices*30

maybe n_slices*2*30?

Why Fe55 delta is different between LIME and LEMON? which is the correct?

maybe is an effect of the effective pixel dimension?
the smaller the pixels, the more concentrated the light in Fe55 and therefore different delta?