Changes in the fluctuation model between G4 8.1 and 9.0

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Very simple fluctuation model : 2 energy levels with energy ϵ_1, ϵ_2

energy loss : excitation with energy loss ϵ_1 or ϵ_2

ionization with loss distributed according to a spectrum $1/\epsilon^2$

in 8.1 (and earlier) 2 regimes - fluctuation as above for not too small mean energy loss

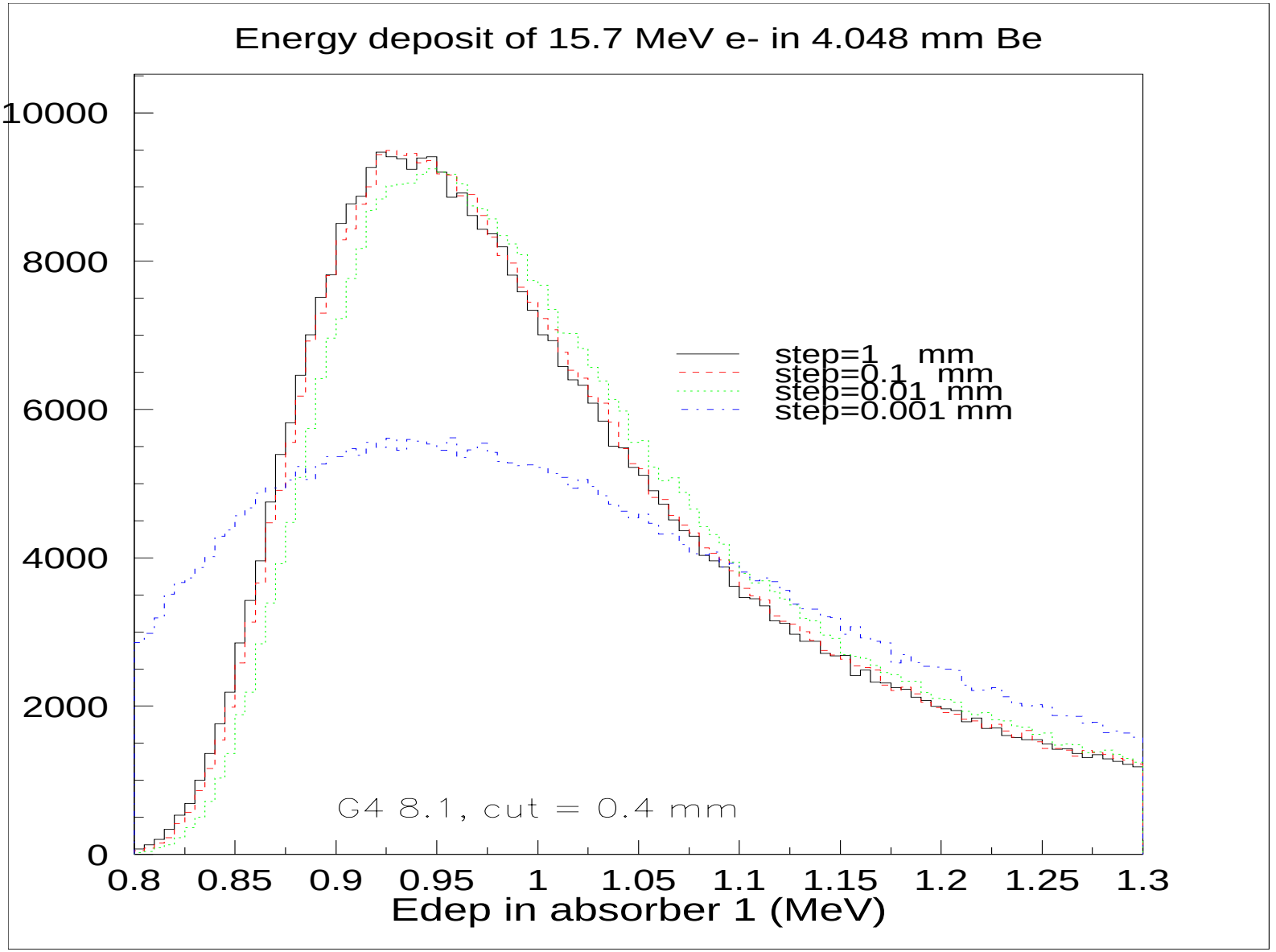
- for small mean loss : excitation only with losses $\epsilon_0 = 10eV$

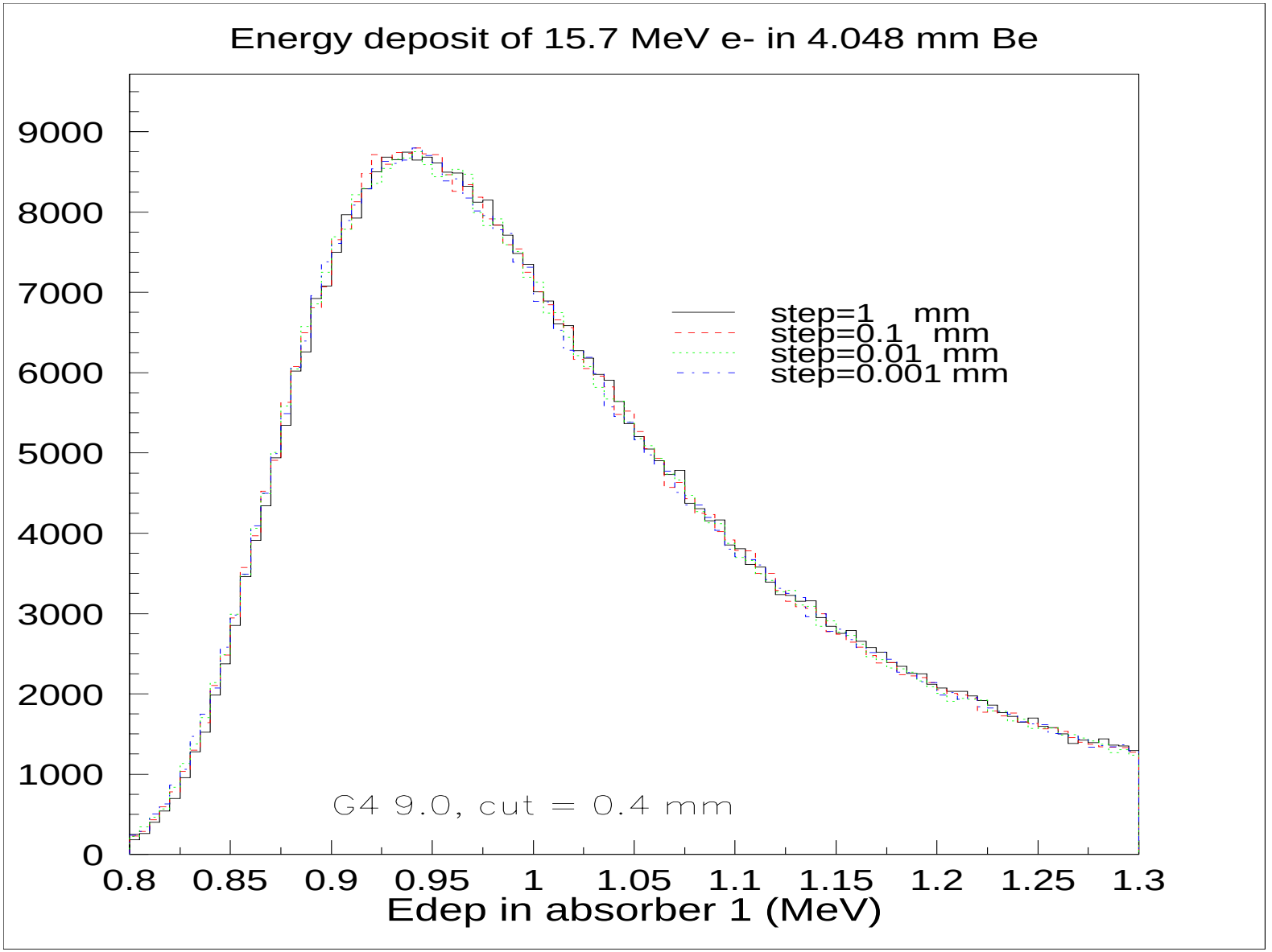
in 9.0 - 'normal' regime only (same algorithm for normal and small mean loss)

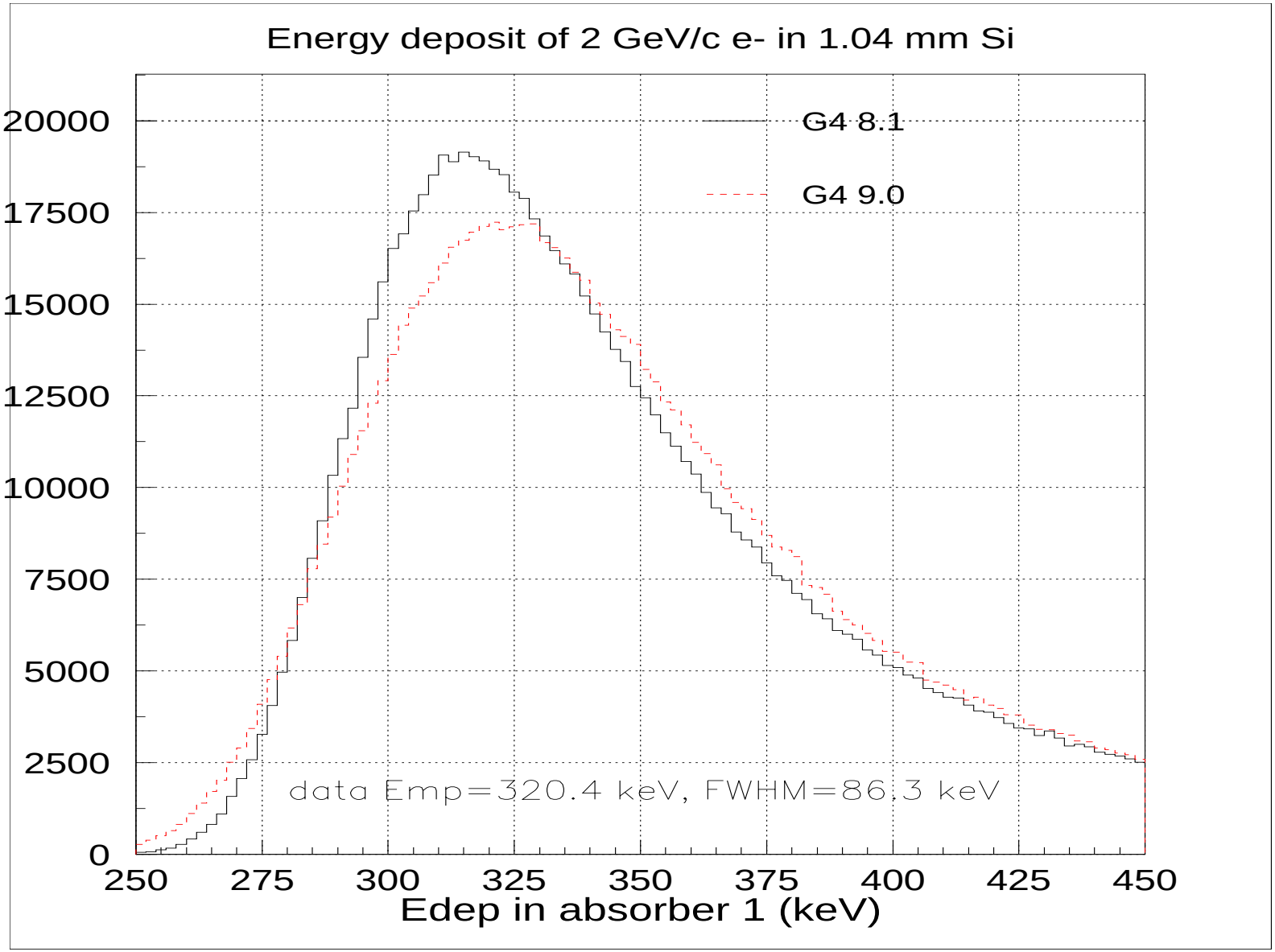
+ empirical width correction ($\longleftarrow$ using some data)

illustration - energy deposit of 15.7 MeV e- in 4 mm Be slab simulated with different stepmax values , G4 8.1, G4 9.0

- energy deposit of 2 GeV/c e- in 1.04 mm Si, Emp + FWHM, 8.1 - 9.0 - data comparison


Energy deposit of 15.7 MeV e- in 4.048 mm Be
10000
8000
6000
4000
2000
0
0.8
0.85
0.9
0.95
1
1.05
1.1
1.15
1.2
1.25
1.3
Edep in absorber 1 (MeV)
step=1 mm
step=0.1 mm
step=0.01 mm
step=0.001 mm
G4 8.1, cut = 0.4 mm


Energy deposit of 15.7 MeV e- in 4.048 mm Be
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0.8
0.85
0.9
0.95
1
1.05
1.1
1.15
1.2
1.25
1.3
Edep in absorber 1 (MeV)
step=1 mm
step=0.1 mm
step=0.01 mm
step=0.001 mm
G4 9.0, cut = 0.4 mm


Energy deposit of 2 GeV/c e- in 1.04 mm Si
G4 8.1
G4 9.0
data Emp=320.4 keV, FWHM=86.3 keV
20000
17500
15000
12500
10000
7500
5000
2500
0
250
275
300
325
350
375
400
425
450
Edep in absorber 1 (keV)