Parallel Session XI
EM - new models and validation

Range validation for electrons, protons and alpha particles

(Michel Maire for Christina Zacharatou)

ICRU'73 stopping powers

(Anton Lechner)

New test on silicon detectors

(Frederic Dupertuis)

Fluctuation model modifications

(Michel Maire for Laszlo Urban)

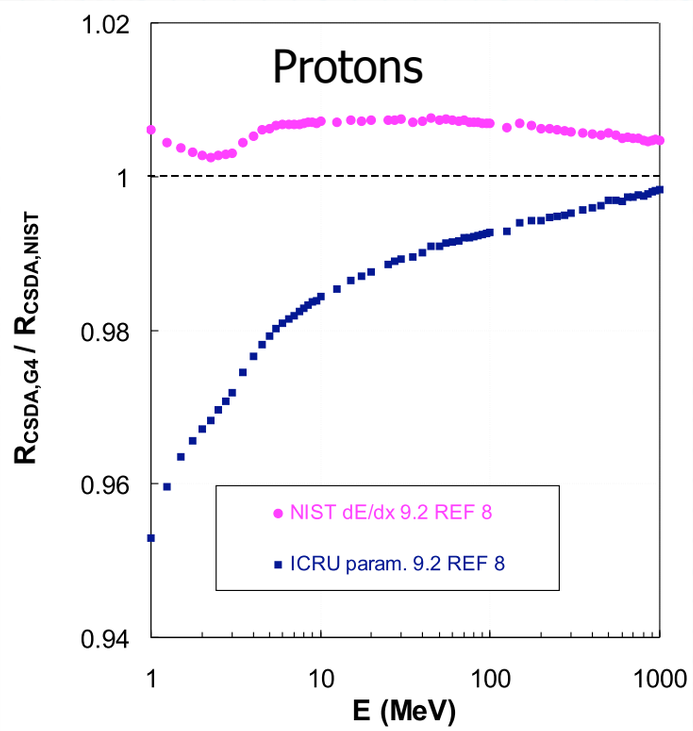
Discussion - Physics List options for 9.3

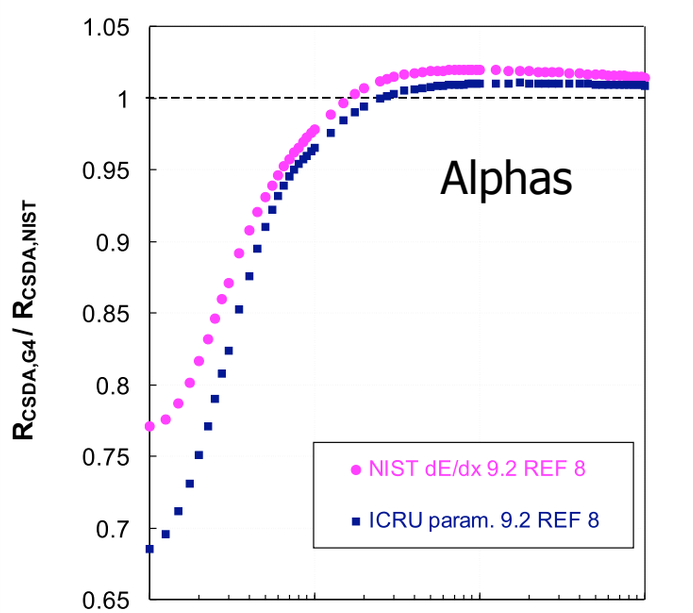
lead by Vladimir Ivanchenko

Range validation for electrons, protons and alpha particles

C.Zacharatou

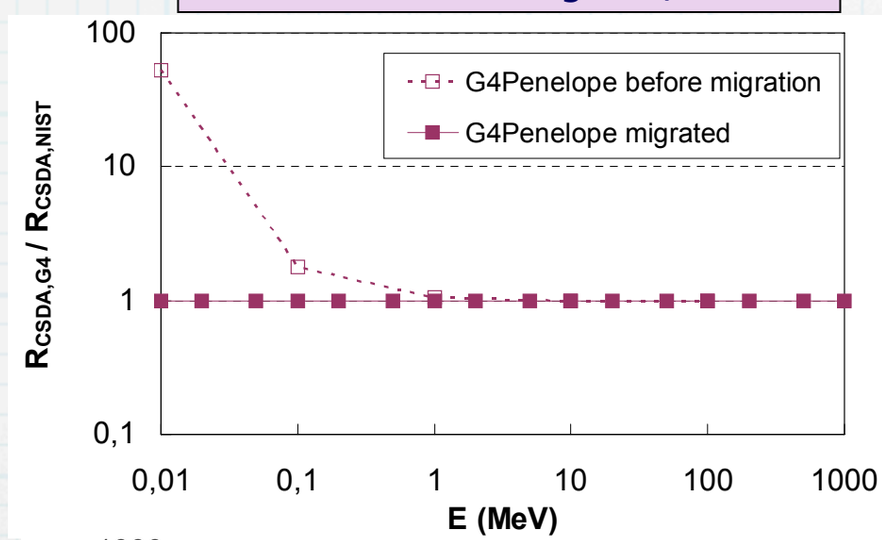
- CSDA range in water
- comparison with NIST for G4 9.2 & G4 9.3β

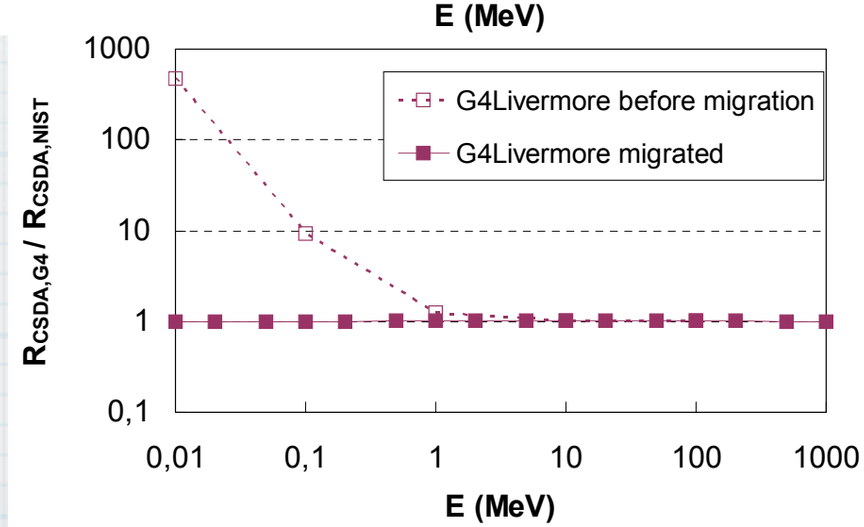




Low-energy models at migration: G4 9.2 ref 4

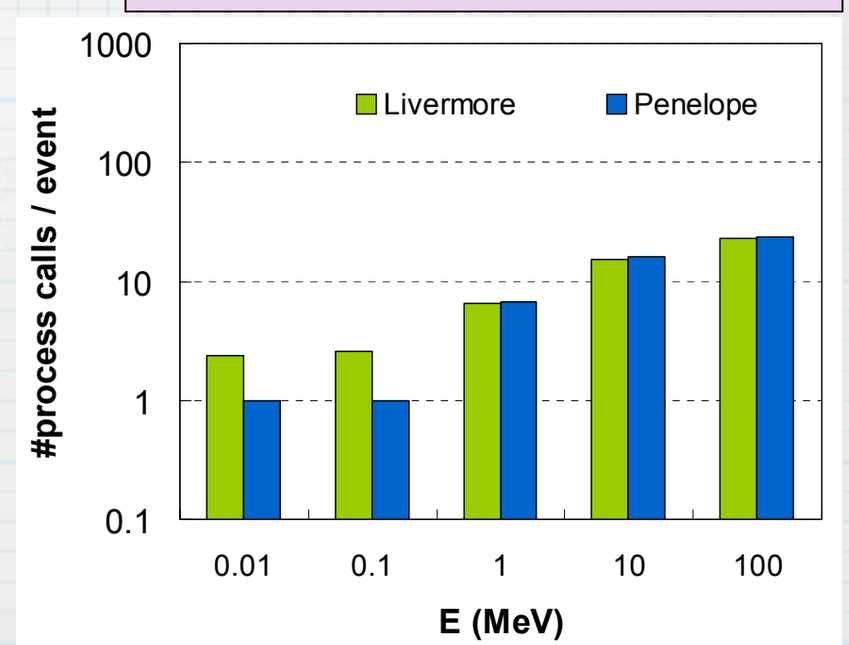
Electron CSDA range G4/NIST:





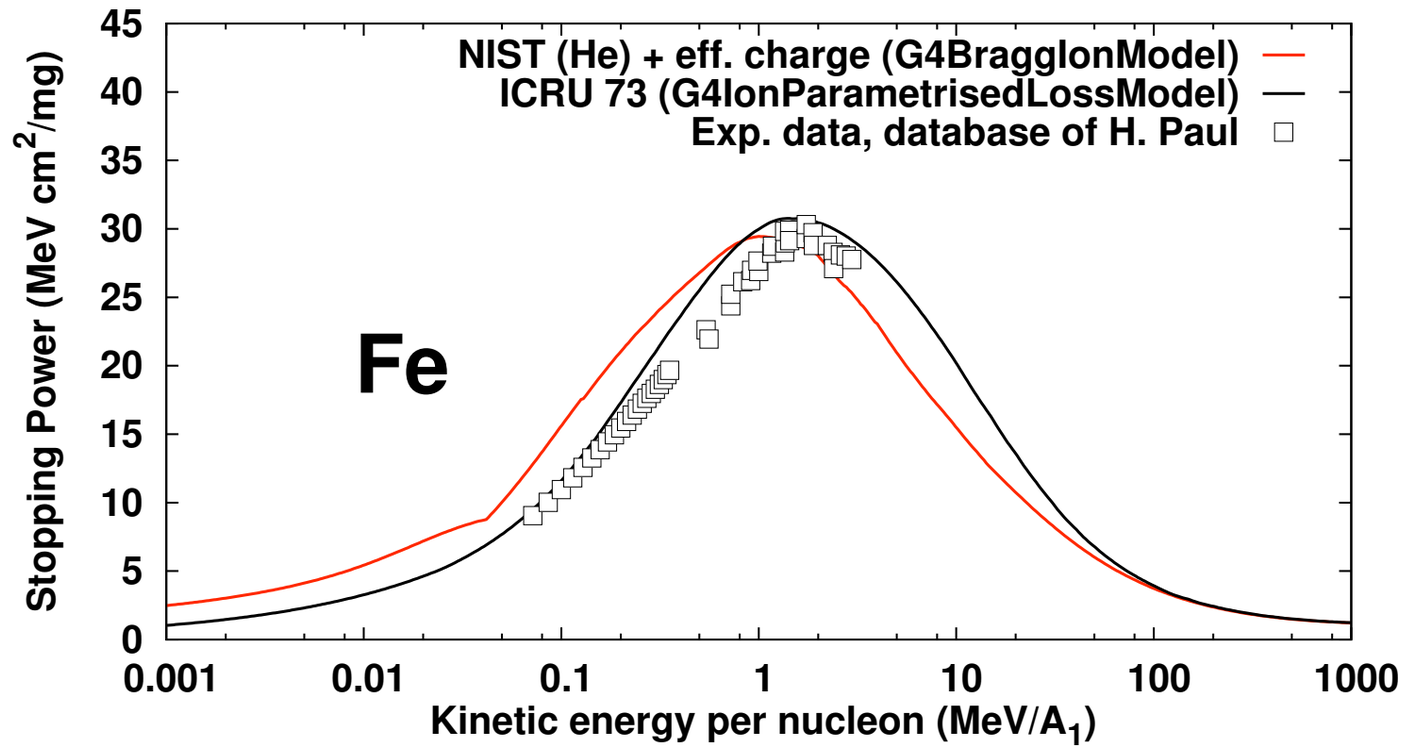
Non-migrated and migrated Penelope and Livermore ionisation in water
(I=75 eV)
Geant4 9.2 ref 04
(infinite cut; msc off, fluct off, eloss step lim off)

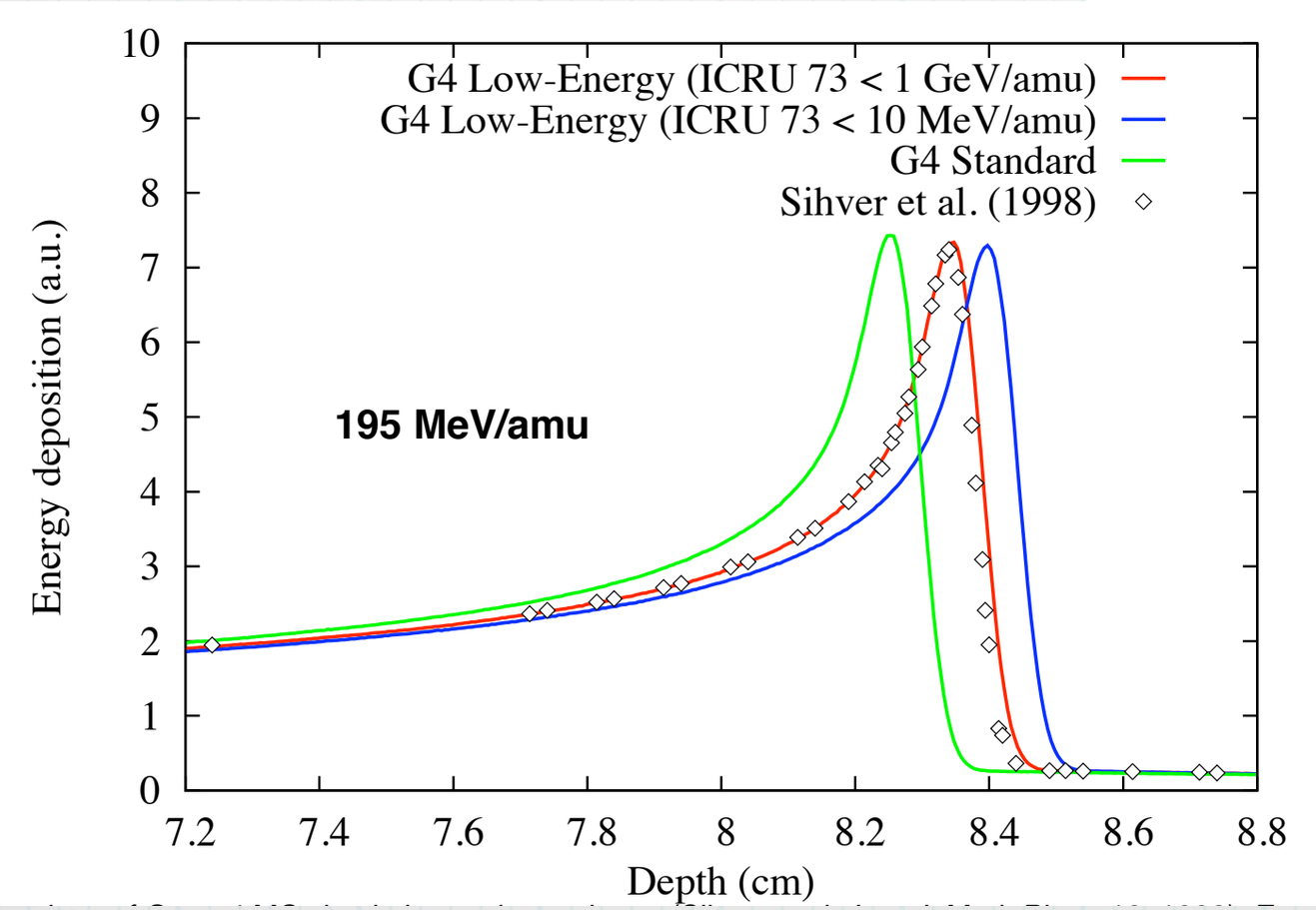
Number of process calls per event before the migration:



ICRU'73 stopping powers

- new ion loss model implement ICRU73 stopping power
- needs to be combined with Bethe-Bloch and Free electron gas model



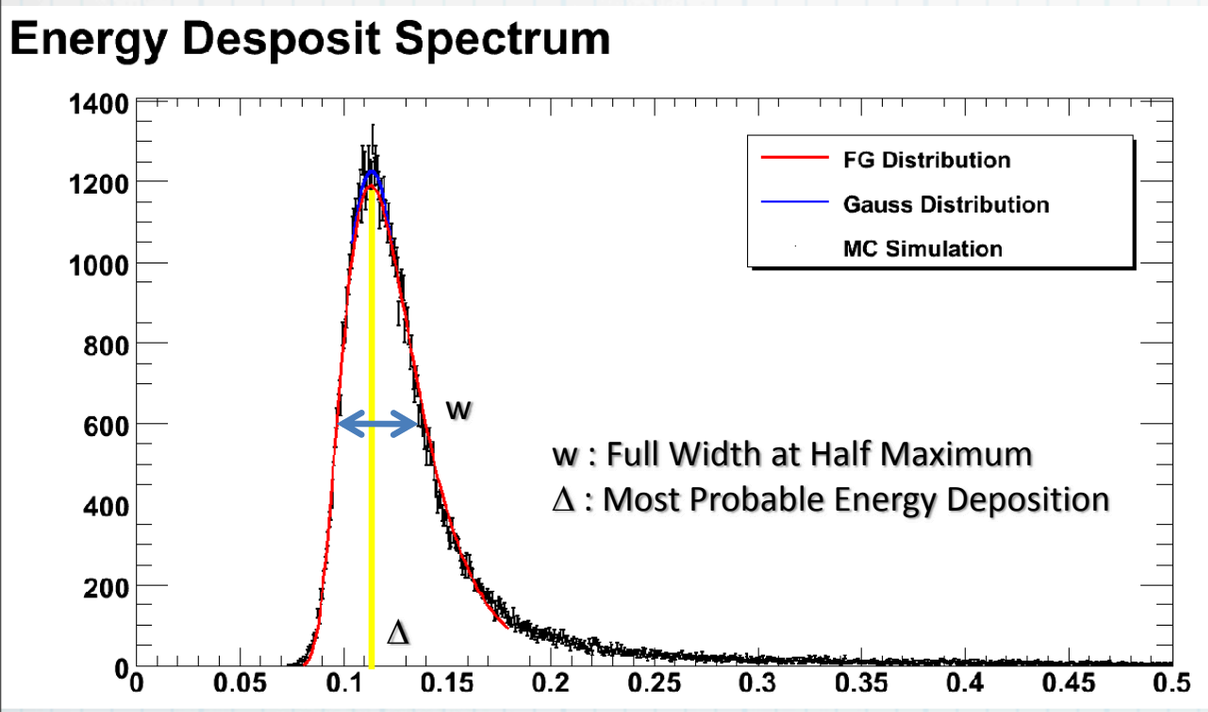


- Problem:
  step size can play a role for very low energies (10MeV/amu)

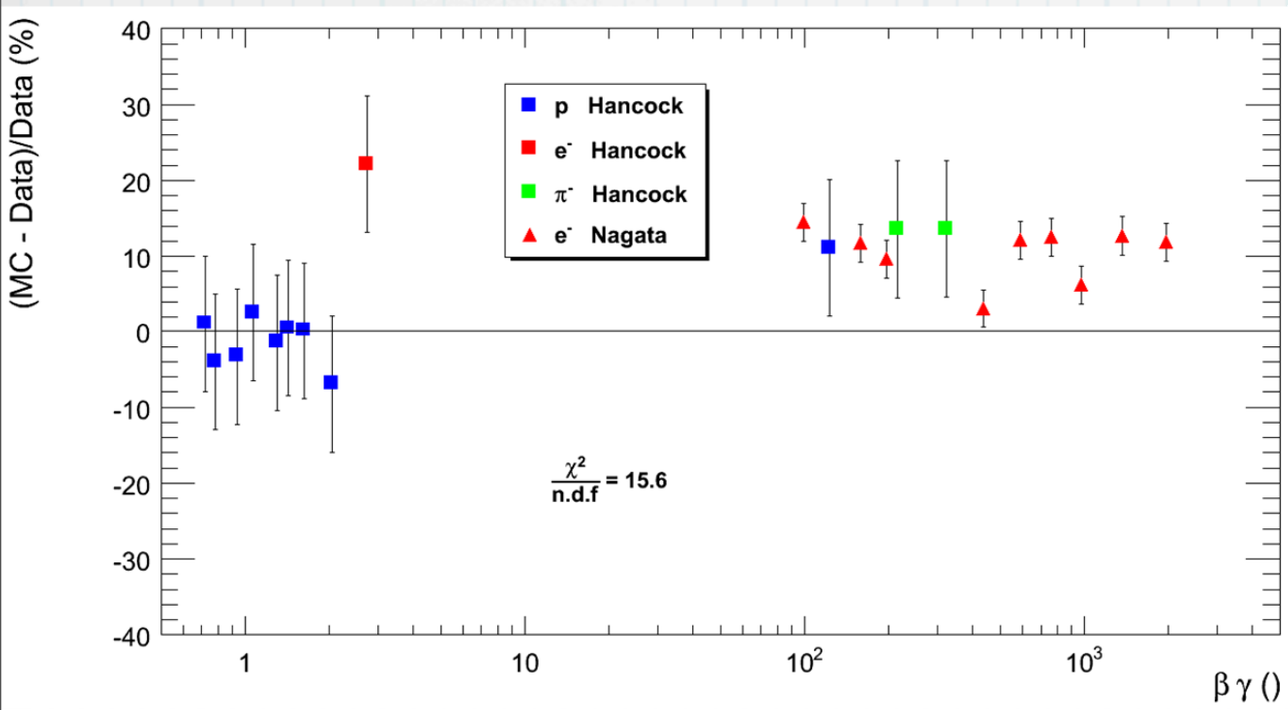
A.Lechner

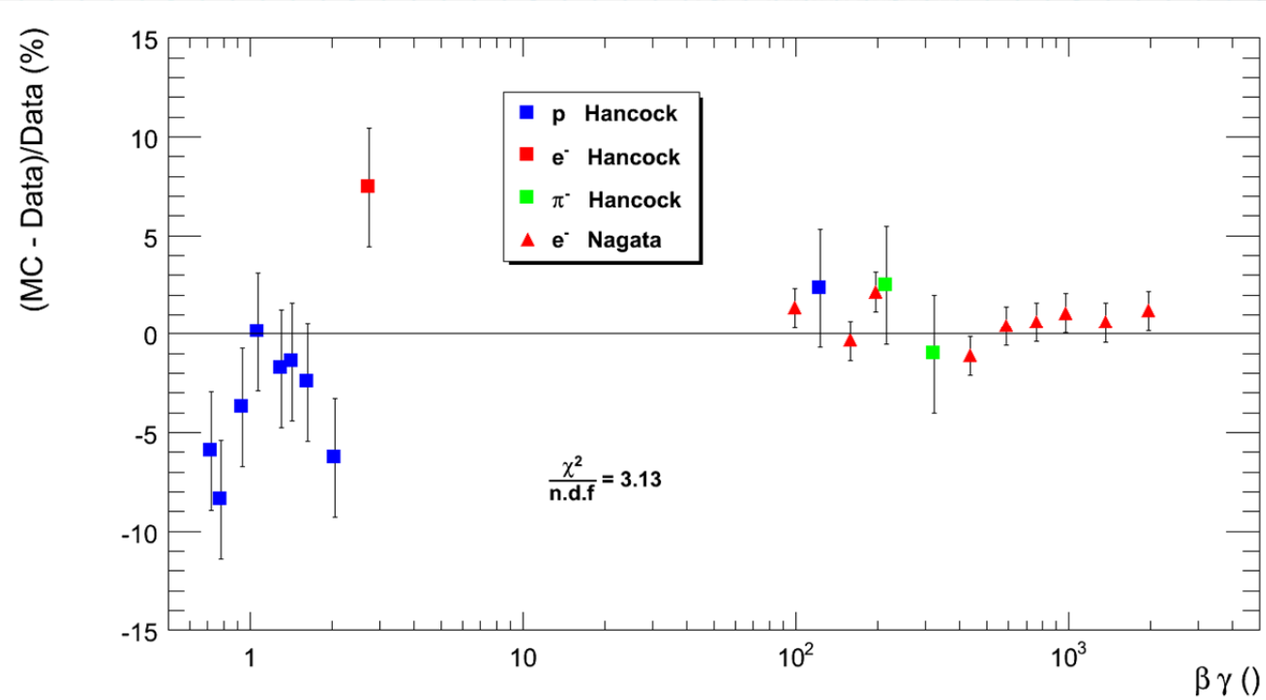
New test on silicon detector

F.Dupertuis



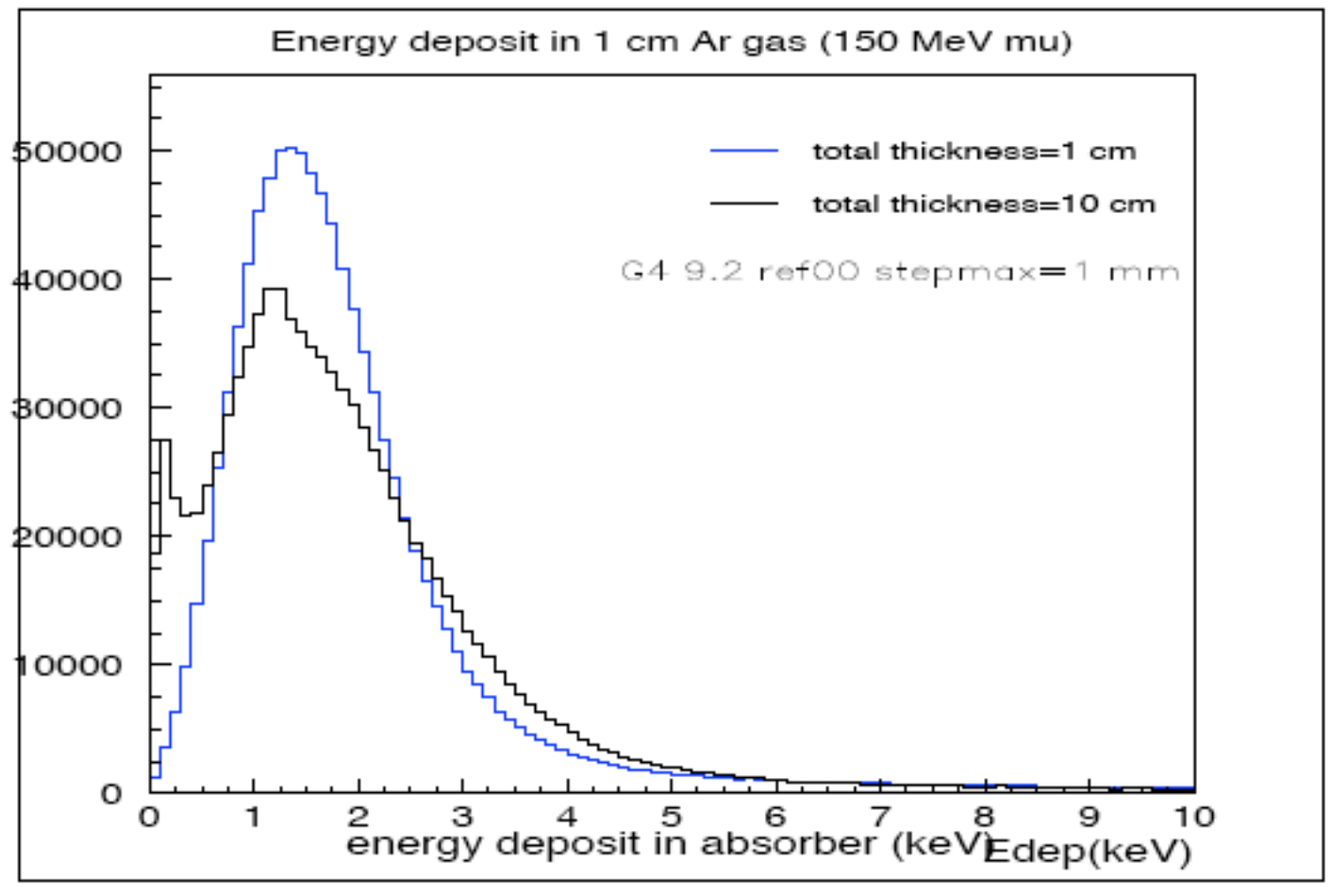
- Thin Si layer
- MPV, FWHM
- comparison with data
- comparison with Bichsel model
- SiTest available

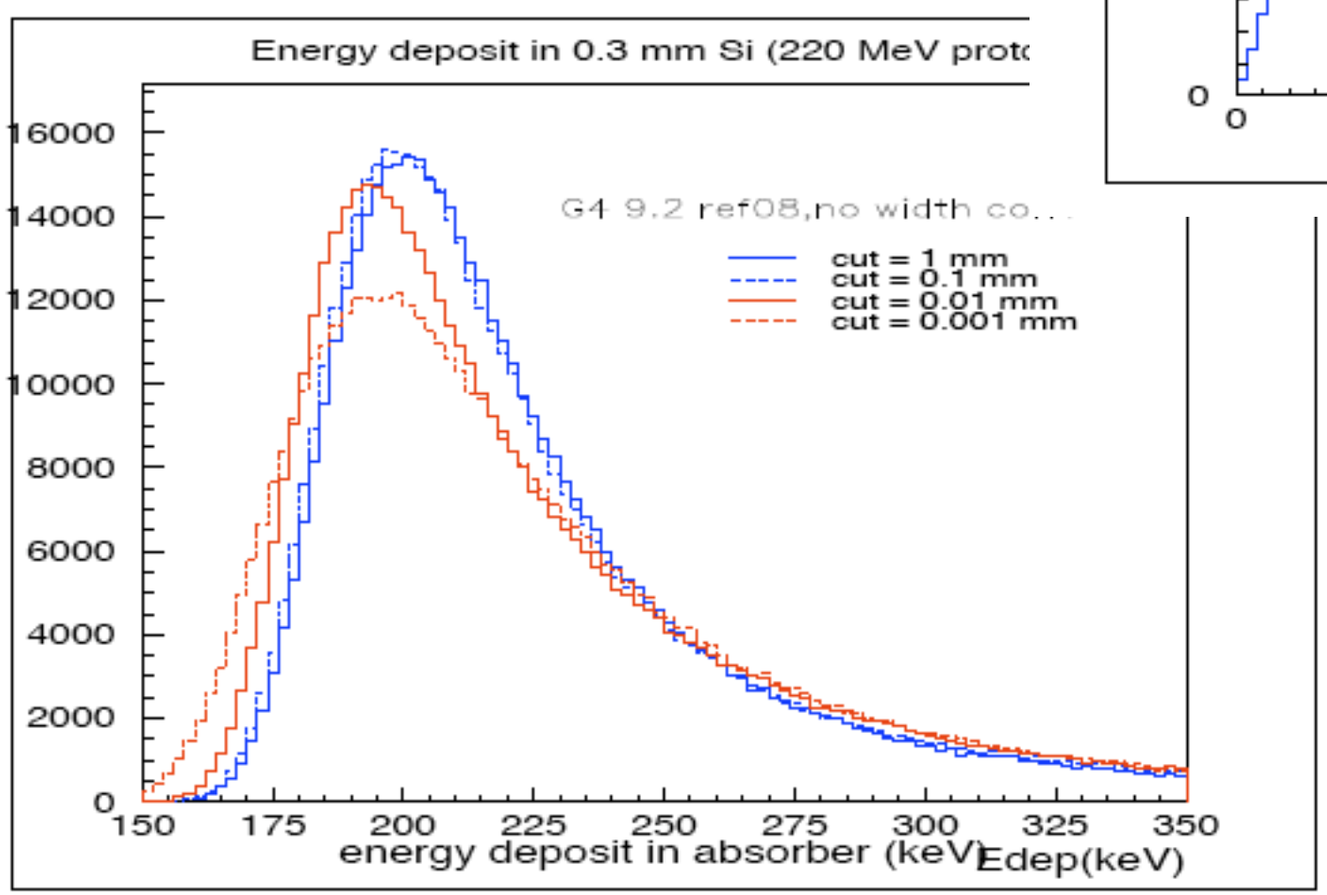




Fluctuation model modifications

- unphysical behaviour in thin layers
- main problem solved
- but some cut dependence remains





- development will continue (no new version before 9.3)

L. Urban

Physics List Options for 9.3

- The list of EM constructors
  - G4EmStandardPhysics – default processes (LHC)
  - G4EmStandardPhysics_option1 – fast (LHC)
  - G4EmStandardPhysics_option2 – experimental
  - G4EmStandardPhysics option3 – precise
- Combined EM builders (LowE & Std)
  - G4EmLivermorePhysics
  - G4EmPenelopePhysics
  - G4EmPenelopePhysics
  - G4EmDNAPhysics
  - G4EmLivermorePolarizedPhysics

Physics List Options for 9.3

- Electron/positrons:
  - UrbanMscModel92 – default, Opt1
  - UrbanMscModel93 – all other builders
- Muons
  - G4UrbanMscModel90 – default, Opt1
  - G4WentzelVIModel – all other builders
- Hadrons
  - G4UrbanMscModel90 – all builders
- G4IonIonization
  - G4IonParametrisedLossModel (ICRU73)
    Opt 3 and combined models
- More Tests needed!